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ABSTRACT

This proceedings of the Fifth International Conference on Web-Based Learning, NAWeb 99, includes the following papers: "Coordinating Different Masters and Customers: Dalhousie's Diploma in Disability Management Program"; "The Design, Development, Implementation, and Evaluation of a Graduate Level Course for Teaching Web-Based Instruction"; "Tracking the Change Process: Adopting Web-Based Teaching in an Education Program"; "Web-Based Instruction: How Effective Is It? A New Zealand Perspective"; "BPM Online: A Case Study Describing the Development and Implementation of an Internet-Based Undergraduate Business Program at Nova Southeastern University"; "Designing for the Web in a Seamless, Multi-Modal University"; "A Hybrid Approach to Web-Delivered Courses: Preparing Principals and Superintendents"; "Accessible Web-Based Distance Education: Principles and Best Practices"; "Multi Tiered Technology Interventions: The Virtual Business Training Center, an Online Corporate University"; "Techniques and Strategies for Internaticnal Group Work: An Online Experience"; "Full-Screen Full-Motion Video & Web-Based Learning: Near-Line Solutions in the Pre-Broadband Era"; "Student Motivation and Distance Education on the Web: Love at First Sight?"; "Model for the Development of Courses Based on Web with Acquisition of Practical Abilities: Experiences of Its Implementation"; "Web-Based Evaluation for the Convenience of Students, Markers, and Faculty"; "Student-Centered, Instructor-Engaged: Lessons from the Asynchronous Frontier"; and "Training Managers of the Distance Education Enterprise: A Master's Degree in Distance Education." Five posters are also included: "Academic Preparat... for Science: A Multimedia Project"; "Why Bother? Reasons for Making the Web Accessible"; "Evaluating Student Perceptions of Web-Based Learning"; "Phase Theory: A Taxonomy of Web Course Management"; and "Molecular Structure Tutorial: Visualization for Change." (AEF)

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NAWeb 99: What Works and Why. International Conference on Web-Based Learning

(5th New Brunswick, Canada, October 2-5, 1999)

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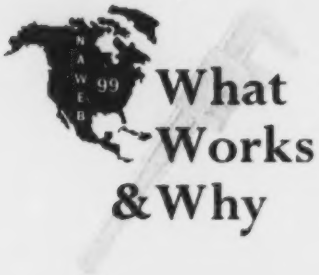

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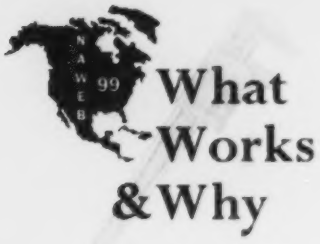

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Bebo White, SLAC: Bebo has been involved with the development of the Web since its conception. In his talk Bebo will anecdotally reflect upon Webmastering for the past eight years, how the Webmaster role has matured and how it will continue to evolve in the future.

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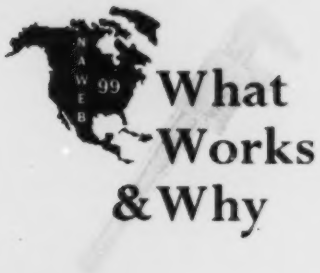

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- Training Managers Of The Distance Education Enterprise: A Master's Degree In Distance Education
- Web-Based Interactive Student Advisement (WISA)

POSTERS

- Academic Preparation For Science: A Multimedia Project
- Why Bother? - Reasons For Making The Web Accessible
- Evaluating Student Perceptions Of Web-Based Learning
- Phase Theory: A Taxonomy Of Web Course Management
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Coordinating Different Masters And Customers: Dalhousie's Diploma In Disability Management Program

Robert Aucoin, Dalhousie University, Canada

Abstract

In 1997 Dalhousie University's Faculty of Health Professions (FHP) and the Workers' Compensation Board of Nova Scotia entered into an agreement to create the first and only university-level diploma programme in disability management offered in Canada. Interest in the program has led to the WCB of the other Atlantic Provinces joining the program for its first offering in September 1999. Private insurers have also expressed interest in the program and will be joining its second entry cohort in January 2000. The programme has been accepted as the National program for the 12 WCBs in Canada.

The DDM focuses on adult and distance learning principles. Learners are supported by their employers through workload relief, the provision of supportive technology, and their inclusion in a critical mass of learners at each site. While learners are relatively homogeneous in terms of work life, the learning cohorts include a variety of students with differing demographics, learning styles, technical proficiency, and educational backgrounds.

Due to the nature and location of the learners, it was felt that a distance learning approach would be appropriate for the programme and, more specifically, the courses would be mounted on the Internet. It was reasoned that only distance education and more specifically Web-based distance education with its focus on the learner centred approach to education could fulfil the needs of all the parties involved: Students, WCBs, private insurance companies, and the Dalhousie Faculty of Health Professions. To this end the Faculty of Health Professions at Dalhousie and Maritime Tel & Tel entered into negotiations to create another partnership to cater to the needs of the faculty and students to jointly support Web-based courses through a specific Web-based educational tool.

From the point of view of the instructional technology co-ordinator, this paper identifies the liaison functions required of this unusual partnership, the challenges in implementation of Internet-based education with this unique group of learners and the interesting professional education features of this first university-level program for disability managers in Canada. The paper also describes the process by which the specific courses were developed using the Web-based educational tool and the pedagogical models used that can be incorporated into the educational tool's template.

Coordinating Different Masters And Customers: Dalhousie's Diploma In Disability Management Program

Introduction

In the early 1990s, the Workers' Compensation Board of Nova Scotia (WCBNS) adopted disability management as part of its service delivery approach. A needs assessment was carried out to determine the need for further training within the WCB on disability management issues. The assessment revealed that there was definitely both interest and need for comprehensive university-level education for professionals involved in disability management within the Board both in Atlantic region WCBs and in private insurance companies. Moreover, a survey of Canadian institutions of higher education revealed that there are no already existing comprehensive university level disability management programmes in Canada.

In 1997 Dalhousie University's Faculty of Health Professions (FHP) and the Workers' Compensation Board of Nova Scotia entered into an agreement to create the first and only university-level diploma programme in disability management offered in Canada. Interest in the programme has led to the WCB of the other Atlantic Provinces joining the programme for its first offering in September 1999. Private insurers have also expressed interest in the program and will be joining its second entry cohort in January 2000. The programme has been accepted as the National Programme for the 12 WCBs in

Canada.

The Diploma in Disability Management (DDM) programme is built around the philosophy of disability management and early assistance as the most effective means to assist injured and ill workers to return to work. To this end the DDM is a ten-course programme built on core competencies of thinking and decision making, communicating, delivering service, working with people, changing and learning, and self-management. It is delivered as a distance-only offering to part-time students over a two-year period.

The DDM focuses on adult and distance learning principles. Learners are supported by their employers through workload relief, the provision of supportive technology, and their inclusion in a critical mass of learners at each site. While learners are relatively homogeneous in terms of work life, the learning cohorts include a variety of students with differing demographics, learning styles, technical proficiency, and educational backgrounds.

Due to the nature and location of the learners, it was felt that a distance learning approach would be appropriate for the programme and, more specifically, the courses would be mounted on the Internet. It was reasoned that only distance education and more specifically Web-based distance education with its focus on the learner centred approach to education could fulfil the needs of all the parties involved: Students, WCBs, private insurance companies, and the Dalhousie Faculty of Health Professions. To this end the Faculty of Health Professions at Dalhousie and Maritime Tel & Tel entered into negotiations to create another partnership to cater to the needs of the faculty and students to jointly support Web-based courses through a specific Web-based educational tool.

In early 1999, an instructional technology co-ordinator was hired for the purposes of overseeing the development of the 10 courses from administrative, technical and pedagogical points of view. Development of the 10 course courses began soon after with the contracting of Dalhousie Health Professions faculty to develop the first three courses.

From the point of view of the instructional technology co-ordinator, this paper identifies the liaison functions required of this unusual partnership, the challenges in implementation of Internet-based education with this unique group of learners and the interesting professional education features of this first university-level program for disability managers in Canada. The paper also describes the process by which the specific courses were developed using the Web-based educational tool and the pedagogical models used that can be incorporated into the educational tool's template.

Partnerships

Dalhousie University and Worker's Compensation Board of Nova Scotia

The Diploma in Disability Management programme was developed through a partnership between the Faculty of Health Professions of Dalhousie University and the Worker's Compensation Board of Nova Scotia. The initial concept originated with WCBNS whereby the staff members identified the need for a more extensive preparation for Disability Managers. At that time, there was not a university level programme in Canada to provide professional preparation in disability management. Shortly after the need was identified, WCBNS approached the Dean of the Faculty of Health Professions to consider co-operating on this matter. An agreement between the two parties was reached whereby a Programme Steering Committee, comprising four members from each partner, was established and a Co-ordinator of Programme Development was hired. The Steering Committee supervised a two-stage process. The first stage comprised an extensive needs assessment of WCBNS employees' knowledge of and attitudes towards their work. Following a review of the needs assessment report, the second stage began, which involved the development of a Diploma curriculum that would become the basis of the programme. During the second stage a Co-ordinator of Instructional Technology was hired to assist in the curriculum development. Following the completion of the second stage of the process, the Programme Steering Committee was disbanded and a Programme Advisory Board was established to supervise the conduct of the Diploma programme, a co-ordinator of instructional technology was hired to assist in the pedagogical development. In addition, at a later date an Academic Co-ordinator was hired to provide additional leadership for the emerging programme.

MTT

The needs assessment conducted prior to the development of the DDM programme indicated that the majority of the potential learners would be outside the Halifax region. The assessment also indicated that there would be a market for the DDM programme outside the Atlantic Canada region and outside the normal Workers Compensation Board channels. It was also clear that the programme would attract mature learners who often had families and would still be required to maintain a sizeable case load at work. Given this scenario it was deemed prudent to look at distance models of education for the DDM programme. The question then was, what sort of distance models would make sense?

WCBNS had agreed to provide support to those employees wanting to pursue the DDM in terms of letters of recommendation and work-time for the purposes of studying. Therefore learners would be able to make use of any technology available in the work place. This made the decision easier since technological concerns were not as prevalent. It was decided to go with on-line learning for a number of reasons:

- The Dalhousie Faculty of Health Professions was already conducting successful trials with online learning
- The WCBNS was interested in online learning for the added value it could contribute to their employees
- Online learning would allow the learners the flexibility they would need to maintain their work load and study
- Online learning would provide the programme the flexibility to expand beyond the borders of Atlantic Canada
- Online learning would provide the interactivity needed by mature learners

Once the decision was made to pursue online learning a search for a good on-line learning tool was conducted. Ultimately the decision came down to two tools: WebCT (supported locally at Dalhousie University) and e-education (supported by MTT, the local telephone company). The decision was made to go with e-education again for several reasons:

- The e-education tool has a more corporate or business design than WebCT
- It was felt that we needed a corporate partner with a national influence for when the programme expands nationally
- MTT is a known and trusted player in the telecommunications industry throughout Canada
- It was felt that MTT was better placed to provide the kind of 7 X 24 support a national programme such as the DDM required

Hence, the Dalhousie Faculty of Health Professions entered into negotiations with MTT for the purposes of creating a client/service partnership that would include not just the DDM programme but the entire Faculty of Health Professions at Dalhousie as well. The negotiations took approximately four months and resulted in a two-year contract providing unlimited support and use of the e-education tool.

Challenges in Implementation

There were a variety of difficulties that were dealt with during the implementation process; some are more significant than others and some continue to be issues.

There have been several changes in the membership of the Steering Committee and the Advisory Board which has created some short term problems, however there has been a continuity of the core members and sense of history of the actions of these groups has been maintained.

The relationship between the partners has been effective in supporting the development of the Programme, however misunderstandings and a lack of information about the mode of operation of each of the partners has created additional problems.

During the process of developing and implementing the programme there have been three different Co-ordinators, not including the Co-ordinator of Instructional Technology; these personnel changes have had a significant impact on the continuity of the development, and the actual implementation of the Programme.

Development of Courses

Once the advisory board developed the overall curriculum it was up to individual course developers to develop the content for each course. These course developers were hired on a contract basis and were often sub contracted by the key players in the development. This process was made particularly difficult in the beginning stages in the absence of a distance learning expert or a co-ordinator for the DDM programme.

In January of 1999 a Co-ordinator of Instructional Technology was hired with the mandate to oversee the development of the technological and distance aspects of the DDM courses. Since online learning is still cutting edge a search began for instructional models useful for online learning. After numerous searches of journals, books and Web sites it was clear that there were no models specific to online learning. A lot of ancillary materials were found including:

- standard behaviourist and cognitive instructional design models
- best practices when designing Web sites
- numerous discussions about interactivity via the Internet

But there were no models specific to designing effective instruction for the Web. In addition to this problem there was a demand from the Faculty of Health Professions and the WCBNS to develop on-line templates that course developers could simply plug in to and type their content directly into the Web site. The obvious solution, then, was to develop our own model of instruction and template for producing this model.

Instructional Design on the Web

The instructional design model that we developed basically followed two premises

1. The model should be learner centred.
2. What makes effective learning in a traditional face-to-face session will also make good learning in a distance model.

So our instructional design model began with traditional systemic instructional design models based on the following diagram:

From the diagram the instructional design model does not look radically different from other instructional design models you have seen. The fundamental differences are to be seen in the items on the outer circles: Media, research and coding. Those seemed to be the key areas that differentiated online learning from traditional learning. The links below go to an online workshop I created on developing online courses. It is password protected so please send me an email to gain access. The pertinent topics covered are:

- Media
- Readability
- Video
- Audio
- Links
- Interaction
- Engaging Students Online
- Chat Lines
- Support
- Help

- Online Reference Materials

Course Delivery

As mentioned previously in this paper the DDM project consisted of a partnership between the Dalhousie University Faculty of Health Professions, the WCBNS and MTT. MTT provided the technological tools to physically place the courses online. Their solution is a turnkey solution known as *e-education*. *e-education* creates the technological scaffolding into which the course developers place their HTML-ready documents. In addition to the scaffolding the tool also provides server space for on-line chats and computer conferences. The home page of a typical course might look like Figure 2.

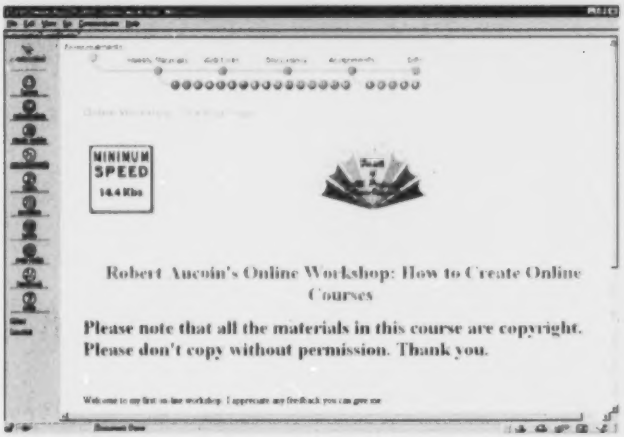
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Figure 2: Home page of a typical online course

The icons at the left of the screen are customisable and what is shown in this diagram is the first version before the chat room and computer conferences (called forums here) were added.

As mentioned elsewhere the students in the programme consisted entirely of disability case managers from both the Atlantic region and Ontario. Learners in the Atlantic region were allowed to use work time and resources to log on to the site, retrieve and use materials as needed and to study. Learners were expected, however, to do most of the study work at home in their own time. Work time was meant to be mostly as a means to allowing learners to use the technical facilities available.

The typical learner is a full-time disability case manager who takes time out from their regular duties three or four times per week to log on to the course using company computers. At this time the learners would answer email and computer conferences and attend any scheduled chats. Learners would also download any required readings at this time in preparation for learning at home. Some learners, however, do have computers with Internet connections at home. The learning experience is much more flexible for these individuals since they can truly exploit the flexible nature of on-line distance learning. However, because of the nature of our clientele we could not assume that all (or even most) of our learners would have access to Internet connected computers at home.

Challenges

Aside from the normal problems in creating any distance course the DDM project created unique challenges for us. To begin with we were dealing with an extremely disparate group of people in terms of background, personal life, experience, technical knowledge, attitude and, perhaps most importantly, education level. Due to the largely unsystematic way in which DM managers have been trained in the past the DDM programme has learners who have a variety of educational backgrounds from individuals with no high school diploma to individuals with Masters degrees and all stops in between. In addition the developers were charged with the mandate to bring all students to a 3rd year undergraduate level before the end of the 2nd of 10 courses. What this has meant was creating interactive courses that were

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supportive enough for those learners who had been out of the classroom for a long time and may not have had the formal education needed and advanced enough for those learners with much educational maturity.

The way in which this was done was through collaborative learning. All of the courses in the DDM programme make liberal use of group or collaborative learning. Attention was paid toward creating cohesive groups that would follow through a single course on multiple projects. Since the learners were all following the courses from their workplaces creating and sustaining these groups was relatively straightforward. The advantages to creating these types of groups are the following:

- Older learners were able to achieve the needed academic level more quickly by observing their more educationally mature learners.
- Younger learners were able to observe more experienced managers who might not have had as much formal education, but, were certainly more experienced in the over all requirements of their jobs and cases.
- Collaborative learning allowed instructors to create larger more complete projects thus allowing learners to see all facets of any one case study
- Collaborative learning allowed everyone a measure of security in what is a very new experience for everyone.

There were other challenges inherent in the partnership model chosen as well. Some of these challenges stemmed simply from the marrying of public and private initiatives. These challenges were essentially cross-cultural in nature since they stemmed from the very nature in which the three organisations conducted business. For example: there were many questions and misunderstandings about intellectual property, the notion of academic credit as currency towards other educational goals and the idea that there would be so many levels of hurdles in getting final approval and accreditation for the programme.

Liaison Functions

The development and maintenance of the programme is dependent on the interaction of several groups and individuals, while carrying out a variety of different functions. In Figure 3. we attempt to model these interactions and through this process identify potential problem areas. For instance, the Advisory Board is comprised of individuals representing two different organisations with their own institutional issues and methods of operation. Also, as can be seen in the Figure, there are two Co-ordinators with separate responsibilities for the same two functions (Curriculum Development and Course Delivery) and both are expected to interact with the Programme Faculty. In addition, the two Co-ordinators are supervised by the Advisory Board, but are actually employed by the University through the Faculty of Health Professions (employment relationships are represented by dotted lines). It is too early in the process to determine how the various interactions contribute to or hinder this education enterprise, however it seems reasonable that this information should be utilised at a later date in evaluating the programme.

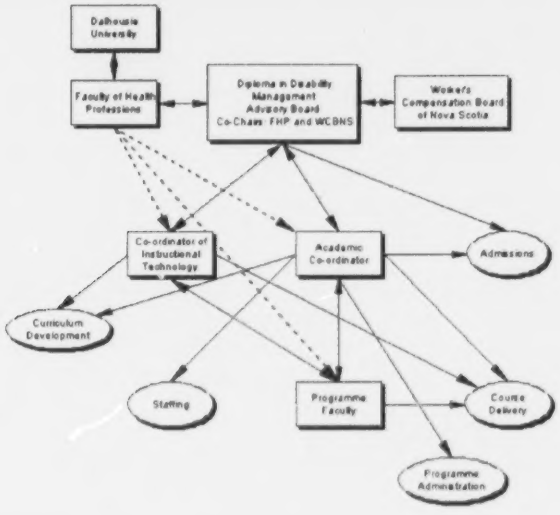

Figure 3: Liaison Functions

Conclusion

If this paper seems a little disjointed then I think we could claim that it is an accurate representation of the process we have endeavoured to describe. Having said that we feel that the sometimes chaotic relationships that went in to building the DDM programme on line have resulted in a cutting edge learning programme using the latest technologies available both in terms of online technologies and online learning models. At the time of this writing we have just hired the first two instructors for the DDM programme and we are beginning to place materials on the *e-education* tool and we are still finalising student enrolments from across Canada. By the time of the NAWeb conference we will have much more to report in the way of online development and actual course implementation and maintenance. Suffice it to say this is very much a work in progress and we expect to be able to report much more on this project in the months to come. Perhaps more importantly we expect major changes over the next 12 months in the programme as we roll out the first full iteration.

Author Information

Robert Aucoin is a graduate of the math department here at Dalhousie and then spent 3 years teaching in rural Zimbabwe which is where he first learned about distance education and how it can be used.

After returning from Zimbabwe he completed an MA in educational technology at Concordia University and then spent 4 years at York University's Glendon College as their educational technologist focussing on videoconferencing applications for distance education.

He is now the co-ordinator for instructional technology for the Faculty of Health Professions at Dalhousie where he is focussing on on-line learning applications of distance education.

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The Design, Development, Implementation, and Evaluation of a Graduate Level Course for Teaching Web-Based Instruction

Nada Dabbagh, George Mason University, United States

Linda Burton, George Mason University, United States

Abstract

This paper will discuss the design, development, implementation, and evaluation of a graduate level course aimed at teaching the concepts and principles underlying Web-Based Instruction (WBI). The overall course goal was to provide an introduction to the principles of WBI and its role in creating learning environments that utilize the attributes and resources of the Internet and the World Wide Web. Particular emphasis was placed on pedagogical, technological, organizational, institutional, and ethical issues related to the design, development, and delivery of WBI.

The course was evaluated on two criteria: the ability of the students in achieving the course objectives and the effectiveness of the course structure in supporting the students towards that purpose. Assessment of students on the instructional activities outlined above served as evaluation instruments for learner achievement. The refection statement, a standard end-of-semester course evaluation survey, student comments, and anecdotes recorded by a peer observer who attended every class and participated in all of the instructional activities served as instruments for course structure evaluation. The evaluation revealed several important results leading to the identification of successful and unsuccessful instructional activities and the level of technological support required to aid students in implementing these activities. Key features in designing courses aimed at teaching about WBI and how to effectively design a WBI prototype were also revealed. These findings and their implications on the design of similar courses will be discussed in the full paper and during the presentation if this proposal is accepted.

The Design, Development, Implementation, and Evaluation of a Graduate Level Course for Teaching Web-Based Instruction

Introduction

This paper will discuss the design, development, implementation, and evaluation of a graduate level course aimed at teaching the concepts and principles underlying Web-Based Instruction (WBI). The overall course goal was to provide an introduction to the principles of WBI and its role in creating learning environments that utilize the attributes and resources of the Internet and the World Wide Web. Particular emphasis was placed on pedagogical, technological, organizational, institutional, and ethical issues related to the design, development, and delivery of WBI. The process of designing, developing and implementing this course was evaluated using a variety of qualitative and quantitative measures. These measures revealed important findings resulting in suggested guidelines for teaching WBI in post secondary education curricula.

Theoretical Framework

The move to online technologies is an evolving and dynamic process of investigation particularly in the area of examining the ability of such technologies to improve the teaching and learning process. In the case of WBI, several frameworks have been suggested to guide the design, delivery, implementation, management, and evaluation of courses that utilize online technologies. One such framework, which can be used to analyze and describe educational Web-Based materials is a three-dimensional framework proposed by Bannan and Milheim (1997). The first dimension of this framework describes the overall design characteristics of a Web-based course in terms of its instructional model (e.g. self-contained course or adjunct to classroom instruction) and its pedagogical philosophy (e.g. instructivist or constructivist). The second dimension describes the instructional methods and strategies used to facilitate learning and to deliver the course content via the Web. The third dimension describes the instructional activities that are mediated through the components (technological tools) of the medium

such as electronic mail, Web page creation, posting projects to the Web, and computer conferencing.

Another framework that can be used to guide the design, development, and evaluation of any instructional program that utilizes the attributes and resources of the Internet and the World Wide Web is the Web-Based Learning (WBL) framework proposed by Khan (1998). It consists of eight dimensions: pedagogical, technological, institutional, ethical, interface design, resource support, online support, and course management. Each dimension has various items addressing its constituents in relation to Web-based learning environments. For example, the pedagogical dimension addresses issues such as instructional goals and objectives, the overall design approach of the course, content sequencing and organization, instructional methods and strategies, the instructional medium (the Web in this case) and the extent to which the course uses its attributes, accuracy of subject matter, and learner assessment. The interface design dimension addresses issues pertaining to the "creation of a seamless integration of content and control" through the physical layout of the information and the conceptualization and implementation of the navigation of the instructional program (Jones & Farquhar, 1997). The management dimension refers to the administration, maintenance, and operation of Web-based courses which includes security issues, updating of course information, provision of course evaluation, tracking of student progress, and feedback on student progress. The ethical dimension addresses issues such as course sensitivity to diverse populations, copyright issues, netiquette, and provision for representation of concepts for a worldwide audience. The resource support dimension addresses issues related to various online and offline learning resources which include archives, bibliographies of related books/journals, searchable glossaries, class distribution lists, and other resources related to WBI. The technological dimension addresses issues related to hardware, software, and course infrastructure. The institutional dimension addresses issues related to institutional policy in delivering WBI. And, the online support dimension addresses issues related to the provision of online resources that aid the learner in instruction or serve as information facilitators if students encounter unanticipated technical problems or questions on the course content. For more details about this framework and its dimensions see: http://www.gwu.edu/~etlkhan/keynote/dimensions/framework1.html.

According to Khan (1997) 'WBI is a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported' (p. 6). Depending on how those attributes and resources are used in a course by the instructor and the learners, the "pedagogical philosophy" underlying the teaching and learning process can range from a strict instructivist approach to a radical constructivist approach (Reeves & Reeves, 1997). A strict instructivist approach typically results in a Web-based course that has a tutorial structure in which the content is organized by the instructor and *delivered* or imparted to the students; and a radical constructivist approach typically results in a more learner-centered pedagogy where students use Web features as tools to construct their own knowledge representations by restructuring content information and creating and contributing their own resources to the course structure (Bannan & Milheim, 1997; Reeves & Reeves, 1997).

Conceptualizing this course was based on the above theoretical underpinnings in an effort to expose students to current frameworks utilized in guiding the design, development, implementation, and evaluation of WBI and to instructional methods, strategies, and activities that could influence the pedagogical philosophy of the resulting learning environment in the process of applying such frameworks.

Course Design

The course addressed in this paper was designed for students enrolled in a graduate degree program in Instructional Technology (IT) at Towson University. Typically these students are employed full time and attend the IT program on a part time basis, taking anywhere from 2 to 4 years to complete their degree. The students represent a variety of teachers, multimedia developers, instructional designers, and technology coordinators. The course was intended as an elective to be taken towards the end of their coursework to insure entry skills in 'Instructional Design and Development' (IDD) or a working knowledge of 'Integrating Technology into Instruction'. Knowledge in basic desktop computing applications and Internet applications was also assumed.

To begin developing this course, a search for similar efforts at other institutions was essential. Two colleagues, one at George Mason University (GMU) and another at George Washington University (GW) had begun such efforts and a three-way communication paved the way to the sharing of work in progress. Selecting the text was almost predetermined as our colleague at George Washington University had edited a book on Web-Based Instruction which emphasized pedagogical, technological, and institutional issues related to the design and development of WBI. The text was therefore a very appropriate choice for this course given the theoretical framework outlined above.

The next step was to develop the course objectives. Having taught an undergraduate course entitled 'Using Information Effectively' which conveyed to students how to effectively use the Internet and the World Wide Web as a research tool, a communication tool, and a collaborative learning tool; the first objectives' draft was formulated using the syllabus of this course as a guideline. The draft was then shared with our colleagues at GMU and GW and the process was reciprocated resulting in several iterations of preliminary course goals and objectives.

Furthermore, an informal task analysis on the emerging content of WBI and associated research revealed factors that should be included in the course content as well as additional information on specific learning outcomes that students enrolled in such a course are expected to be able to demonstrate. The analysis was facilitated through a comprehensive Internet search, an ERIC search, a review of relevant resources the authors had gathered from previous distance education classes and materials collected at related conferences. Selected relevant materials from this analysis served as the bibliography for the course (see research bibliography).

A final draft emerged with the following objectives:

Upon the completion of this course, students will be able to:

- demonstrate an understanding of the fundamental principles of the Internet and the World Wide Web (WWW) and their implications on teaching and learning;
- utilize the Internet and the WWW to locate educational and instructional resources;
- identify criteria for evaluating the validity and accuracy of Internet resources and apply those criteria to the evaluation of educational resources in particular;
- identify parameters of acceptable use policies of the Internet/WWW in educational environments;
- discriminate between educational and non-educational uses of the WWW;
- discriminate between WBI and other educational uses of the WWW;
- demonstrate an understanding of the principles of linear and non-linear multimedia design and the implications of each on teaching and learning;
- demonstrate an understanding of the levels of interactivity of WBI and their implications on the design and development of instructional modules;
- demonstrate the use and application of appropriate instructional strategies for developing WBI;
- demonstrate the use and application of Internet/WWW related technologies;
- design and evaluate a Web-based instructional module using the principles above;
- demonstrate an understanding of Web-based management tools and their application to the development of WBI.

Next it was important to determine how this course will be offered. Would it be an online course considering its topic? Would it be offered partially online with some face-to-face classes? Or, would it be offered in a face-to-face format with some online activities and Web supported material? Several factors influenced this decision including expected class size, the ability of the technological infrastructure at the university to support a fully online course, students' accessibility to the Internet and the WWW from off-campus locations, provision of online support to students and faculty, and finally, the 'acceptance' or 'comfort' level of students with an online versus a traditional learning environment. Although Towson university had adopted WebCt (a Web-Based Course Authoring tool) as an online teaching and learning tool and faculty training workshops were being scheduled to bring faculty up-to-speed with the use of this tool, the online support dimension for this tool and for other similar computer mediated communication tools was either 'under construction' or not present at the time. Therefore, there was no guarantee that student support would be available in time for delivering this

course in an online format. Furthermore, the expected class size was projected to be somewhere between 8 to 12 students and the department chair strongly felt that our graduate students were not ready to enroll in an online course and that most would prefer face-to-face instruction and interaction.

In conclusion, although this course was *about* WBI, the use of the Web and the Internet in delivering the content and implementing learning activities was supplementary to in-class instruction. The class met on a weekly basis for the duration of the semester and all Web-related and online activities were adjunct to this traditional classroom format. This is known as Web-supported or Web-enhanced instruction. The classroom however was equipped with state of the art computers with Internet connections and Web development software to support the nature of the course objectives. Each class session usually began with a brief discussion of the readings for the week followed by an online quiz and a presentation by the instructor on a concept in WBI. The second half of the class was devoted to teamwork on a group project and other related assignments whose details are discussed below. A total of nine students enrolled in the class.

Course Development and Implementation

Several instructional activities were developed to support the objectives outlined above. Weekly online discussions aimed at facilitating students' articulation of their understanding of issues discussed in the readings were conducted through a class listserv. Each student was required to post two questions to the listserv related to the topic of the week, respond to another student's questions, and provide feedback on responses to their questions by others. The questions and validated responses were used to construct weekly online quizzes administered during class time. A brief discussion guided by the instructor preceded the administration of the online quiz each week allowing students to further elaborate on issues that were in need of clarification. Presentations by the instructor and guest speakers on related topics also supported this process. At the end of the semester, a final exam assembled using questions from the quizzes was administered. Students were also required to submit a two page reflective statement discussing their viewpoint on the effectiveness of the online discussions, online quizzes, and online resources in enhancing their learning of the concepts articulated in the readings.

The main percentage of the course grade however was assessed through the design and development of a WBI prototype on an instructional topic of their choice. This was a group effort. Prior to commencing this project, students were asked to evaluate existing online courses using the Web-Based Learning (WBL) framework mentioned above. Having completed this activity, the students were a step closer to understanding the issues involved in designing an online course and proceeded to discuss these issues within their groups. The group assignments were based on mutual interests in content domains which students had communicated to the instructor via a class survey administered at the beginning of the course. One of the questions on the survey specifically asked each student to select an area of interest for which they would like to develop a WBI prototype. After the groups were identified, subject matter experts in the designated content areas were assigned to each of the groups. The purpose of the subject matter expert was to support students in content design and to provide an expert review of the prototype as formative evaluation.

The project was implemented in three phases. The first phase consisted of submitting a *project proposal* based on specific guidelines supplied by the instructor. The guidelines were based on Ritchie and Hoffman's (1997) interpretation of how instructional design principles can be incorporated when designing instruction for WWW delivery. Further elaboration by the authors on these rudimentary guidelines yielded the following seven instructional design elements that guided students in developing their project proposal:

- Identifying what is to be learned:
- What is the knowledge domain (content of instruction)? Is it ill-defined (fuzzy, involves higher order thinking skills, highly abstract, complex, open-ended, interpretive, conjectural, subjective, etc.) or well-defined (concrete, specific, objective, procedural, predictable, structured, etc.)?
- Identifying the learning outcomes (instructional goals, performance objectives):
- What will students be able to do after interacting with this instructional unit?
- What is the terminal (overall) objective?

- What are the enabling objectives that will lead to the mastery of the terminal objectives?
- Identifying the audience:
- Who is the audience (demographics)?
- How diverse is the audience?
- Where is the audience (same location, different locations)?
- Identifying past (prerequisite or prior) knowledge:
- Will the learners be expected to have a set of skills (or knowledge base) before embarking upon this instruction? If so, what is this set of skills?
- How will you determine if learners possess the necessary prerequisite knowledge?
- Will the WBI course offer links to this prior knowledge to help learners who do not have it determine if they can take this course or help remind them of previously gained knowledge?
- How self-directed are learners expected to be for this instructional unit? Is there a specific learner profile (learner characteristics) that is most suited for this instruction?
- Identifying the level of online instruction:
- Will this WBI unit be delivered totally online or is it used to support (enhance) traditional classroom instruction?
- Will learners be required to have some knowledge of online learning? To what extent?
- What is the role of the instructor in this course?
- Identifying instructional strategies/activities:
- Will the course provide collaboration, facilitation, modeling, etc. (see pedagogical dimension of WBL framework)?
- What WBI features will the course provide (Khan chapter one)?
- How will the course motivate the learner to help them stay on task? What multimedia components will it include to make the instruction authentic and relevant to the learner?
- Identifying assessment and evaluation:
- How will learners be evaluated to determine if they have achieved the learning outcomes?
- How will guidance and feedback be incorporated?
- Will there be a self-assessment component?
- Will there be enrichment and remediation depending on the results of the assessment?

Students posted their proposal on the Web and received feedback from the instructor and their peer groups on how well their proposal met these guidelines.

The second phase was a design document, which would serve as a blueprint for the actual prototype. The design document was a detailed elaboration of their project proposal with the added task of arranging the instructional content and activities based on the Instructional Framework for Web-Based Instruction (Milheim, Bannan, and Harvey, 1997). This framework identifies a continuum of WWW instructional activities in which lower levels are subsumed in higher levels resulting in increasing levels of interactivity. The levels range from information delivery (level 1) to information synthesis and creation of resources by students (level 5), to the design of immersive collaborative environments (level 6). Students in this course were only required to develop a prototype that incorporated levels 1, 2, and 3 of the framework. Level 1 included dissemination of basic information to learners such as syllabus, class notes, assignments, etc., allowing for such material to be accessible locally or at a distance. For level 2, students were required to provide pre-defined links to outside sites that related to the topic of instruction, and to specify relevant instructional activities to be carried out at these sites. Finally, for level 3, students were required to provide online interaction for learners utilizing one or more forms of synchronous and asynchronous computer mediated communication.

The final phase of the project involved developing the prototype using a Web development tool (FrontPage was used in this course), adding the necessary Web features to make it functional, and evaluating it using formative evaluation techniques. The instructor suggested the following Web-based components that would enhance interactivity as required by level 3 of the Instructional Framework:

- A marquee to cue the learner to some aspect of the instruction.
- A thumbnail to help the learner visually study an aspect of the content.
- An animation to motivate the learner or provide feedback on some aspect of the instruction.
- A hover button that displays text, cueing the learner to some aspect of the instruction or providing

more detailed explanation about a visual, object, etc.
- A mailto (email) function for student-instructor communication.
- Bookmarks (anchors) within a page or when linking to another page to reduce the amount of scrolling that a learner has to do.
- A form for students to fill out and submit (can be an online quiz, a prerequisite knowledge survey, or other instructionally relevant information).
- A counter to record the number of hits (decide which page or pages are important for collecting this information).
- A search tool to search terms in glossary or other pages of the WBI unit.
- A discussion board for online interaction (state purpose of discussion board for learners).

The above Web-based components are integral to a WBI system in that they can provide features that are conducive to learning and instruction (Khan, 1997). For example, inserting a *search tool* (a WBI component) can provide *online searching* (a WBI feature) which enables students to use a searchable course glossary or to use search engines to find relevant online resources related to course content. Similarly, *a discussion board* is a WBI component that can provide *asynchronous communication* (a WBI feature) which promotes collaboration. Therefore students were required to justify the instructional purpose of using a WBI component, or alternatively, anchor the component in an instructional activity that was meaningful.

The prototype was evaluated on its interface design, usability, and instructional design and delivery components. In terms of interface design and usability, issues such as navigation structure, link structure, visual appeal, and accuracy were assessed. For the instructional design and delivery component, the prototype was evaluated on the strength and cohesiveness of the relationship between learning outcomes, instructional/learning activities, and learner assessment techniques. This relationship was based on the overall pedagogy or instructional strategy adopted for the design of instruction which was addressed by the students in the project proposal phase.

Course Evaluation

The course was evaluated on two criteria: the perceived ability of the students in achieving the course objectives and the effectiveness of the course organization and structure in supporting the students towards that purpose. Assessment of students on the instructional activities outlined above served as evaluation instruments for learner achievement. The refection statement (which was also an instructional activity), a standard end-of-semester course evaluation survey, and student comments and anecdotes recorded by a peer observer served as instruments for course structure evaluation. The participant observer attended every class and participated in all of the instructional activities.

The evaluation revealed several important results leading to the identification of successful and unsuccessful instructional activities and the level of technological support required to aid students in implementing these activities. Key features in designing courses aimed at teaching *about* WBI and how to effectively design a WBI prototype were also revealed. These findings and their implications on the design of similar courses are discussed below.

Methodology and Data Sources

As mentioned above, the course was evaluated on two criteria: perceived learner achievement and course organization and structure. For the purpose of this case study, perceived learner achievement will be assessed primarily through students' reflection statements. The reflection statement required each student to describe his/her experiences with the online components used in the course, mainly the online quizzes, online listserv, and online resources. Students were asked to discuss their experiences with these course components in terms of their effectiveness in enhancing their learning. Students were also required to reflect on the WBI models and frameworks that they learned about in the readings and to select a *preferred* model, provide adequate reasoning for selecting such a model, or suggest their own model if they found fault with other models. Therefore we felt that the content of the reflection statement was sufficient in providing information that demonstrates perceived learner achievement. In the following sections we will discuss the methods used in evaluating the course organization and structure

which include the reflection statement. We will then summarize our findings and present our conclusions.

Course Structure Evaluation Methods

The methods used in evaluating the course organization and structure were comprised of observation and participation of a faculty member who helped conceptualize this course, student reflection statements, and an end-semester course assessment tool.

Participant observation

The faculty member who attended every class and was a full participant in all class activities recorded her observations on specific instructional strategies as outlined below.

Presentations on Special Topics

'Instructor presentations frequently included examples to illustrate the concepts under study. On several occasions outside experts were brought in to present and to answer students questions. One session that was particularly interesting and helpful was when the instructor arranged for the author of the course text to come and meet with the class. The author's explanations made his framework more meaningful. We had used his framework to evaluate existing online courses prior to starting our own WBI prototype.'

'Another session that was particularly helpful was when a professor who was an expert on WebCT (a Web-development tool for putting courses online) was invited to the class to explain how he had used this tool in an introductory Computers and Creativity class to conduct online activities and present the course content. He shared some insightful findings about the features of this tool that were very helpful in the development of our prototype.'

Evaluating existing online courses

'An excellent learning experience was looking at various online courses on the Web to see examples of the types of courses that were available online and actually being used. Students were given lists of several existing online classes and were asked to review these courses based on a Web-Based Learning (WBL) framework developed by Khan (1998). Aspects of this framework were presented and discussed and students were required to compare and contrast the features of the online courses in relation to the dimensions of this framework. This was an interesting and informative assignment, which took several weeks to complete. It allowed students to look more critically at specific elements of the online courses such as interface design, perceived interactivity, instructional strategy, online support, institutional support, management support and technological issues.'

Teamwork

'Teamwork was a major part of the course. The group experience was interesting and challenging. The instructor surveyed students in the class about their background and interests and suggested the group makeup. My group was composed of three students. Like many adult learners taking college courses, times available for group meetings outside the class was limited since all members had the equivalent of full time jobs in addition to taking the course. The only time that our schedules permitted out of class meetings was a half-hour before the scheduled class time.'

'At our first meeting we briefly brainstormed ideas to determine an instructional topic for the WBI prototype. One member was interested in developing a Web site to support people who are in grief due to a crisis situation since she had reviewed a similar Web site and had some experience in that area. The other, an elementary school teacher was interested in a site that teaches young children how to discriminate between animal sounds, and I suggested something related to computer or Internet basics since there was a definite need for online education in that area as well as it being a topic in which we all had a basic knowledge. After two more meetings that included much discussion of these as well as other ideas and investigation of other instructional Web sites, we chose computer basics as the topic for our

instructional Web site.'

'In subsequent meetings we determined how to go about organizing this Web site. Each group member had ideas that were usually compatible with what others were thinking. These ideas were largely based on what we gleaned from the online courses that were evaluated earlier in the semester. When our ideas differed, we discussed and negotiated until we came to a consensus or agreeable solution.'

'At times, group members disagreed on interface design issues but were able to resolve these issues based on suggestions from our subject matter expert and the readings. As group work evolved, email became more frequent and was important in determining each group member's tasks. At times group members were frustrated by the slow response of other members that was usually due to limited access, technical problems, lack of time, or members just not regularly checking email.'

'Throughout the group experience, the instructor met periodically with groups. The instructor gave very detailed feedback in the later development stages of the prototype which was extremely helpful.'

Online Listserv

'The instructor had set up the listserv before the class began and during the first class session the online expectations and protocols were explained. Overall, the established listserv protocols worked well even though it did take a few weeks for all to become accustomed to them. The instructor assisted by reminding students either via email or in class of the protocols when she observed that students were not following them.'

'This experience required going online three or four times a week. This would not be a problem for full time graduate students who are often on campus, but since most students in the class had full time jobs or worked part time and took several classes; finding the time to get online at the appropriate times took some planning on the student's part. Calling in from remote locations to the campus computer often took longer than necessary. However, even with these circumstances, most students met the requirements. If requirements were not met, the instructor checked with students either before the class sessions or in the next class session as to what had occurred. On several occasions, students thought they had posted to the listserv, but for some reason, questions had not gone through.'

'Overall posting to the listserv was very helpful as a learning tool as it forced me to look at assigned material early in the week even though at times I was less enthused about participating than at others. However, it just became one of the things that I knew I was to do early in the week. Although this activity did encourage students to at least look at the assigned chapters early in the week, I frequently found myself just perusing the chapters in search for good question material as opposed to studying the concepts. Some chapters seemed not to have material that was worthy of asking intelligent or higher level questions, but most contained significant concepts.'

Answering Others' Questions

'I found that trying to find the answers did help me learn the material for in looking for the answers I frequently reviewed material I had looked at before when I was attempting to compose a question. Additionally, I often encountered material that I found interesting and would get sidetracked reading that material. Sometimes, I would have to go online several times to find an unanswered question. In answering questions, when several were available, I often found myself choosing easier questions, or ones I already knew the answer to rather than ones I had to spend more time seeking the answer. However, on several occasions I enjoyed engaging in discussions centering around the question and posting my opinions in reaction to or about questions.'

'For the most part, students composed questions that were significant in learning major frameworks or concepts in WBI. I was impressed that most questions were well designed and indicated that the student had reflected on the content and put thought into the development of the question.'

Validating Answers to Question Asked

'Validating others questions was usually fairly simple. It was just a matter of reading the answer and usually sending a comment to the person answering the question such as "This is exactly what wanted!" or "Your answers are correct. Great job!" Occasionally a question would be answered either partially or totally incorrect and the correct answer with explanation needed to be given.'

Reviewing Others' Questions

'Reviewing and studying other students questions gave me a perspective of what others students in the class perceived to be significant content. I found reading the questions to be helpful in learning the material and sometimes they would motivate me to go to the chapters to find other related material. For example, if a student asked a question that requested naming and describing four of the six factors of a concept or framework, after reading the answer given, I would go to the chapter to find the factors that were not named in the answers.'

Quizzes From Online Questions

'During the first several weeks of class I felt that the online quiz was anxiety producing and did not create a positive learning experience especially the first 20 minutes of class time. In other words, instead of going to the class looking forward to an enjoyable learning experience, I went in just hoping that I could remember all the information I had reviewed from the listserv questions.'

'At times I felt that the quizzes took more class time than the learning that resulted from the overall experience. Even though the quizzes were short, they seemed to take about twenty minutes of class time each week. A possible alternative would be a short discussion on the material each week and quizzes given less often such as every two or three weeks.'

'Sometimes I felt that the rewards of the online learning experience were not worthy of the time required for the activity. However, in my above analysis I probably am not taking into consideration the rewards that the experience provided in learning about the value of online communication in the learning process.'

Student Reflection Statements

As stated earlier, students were asked to write a two-page reflection statement addressing the following questions:

1. This course had 3 online components:

- Listserv discussions;
- Online quizzes; and
- Online resources (through course home page, syllabus, and instructional resources page).

Describe your experiences with these components, both positive and negative, in terms of their effectiveness in enhancing your learning.

1. The readings offered several models/frameworks for the design of WBI (Khan's WBL framework, Keller's model, the Instructional framework, Reeves & Reeves dimensions, Event Oriented Design model, Active Learning principles, etc.). Pick your favorite model/framework and tell why it might be more effective than the others, or better yet, come up with your own model for designing effective WBI and explain its basic principles.

Student responses to question two of the reflection statement will be discussed only to the extent that they bear relevance to the evaluation of the course organization and structure. To this effect these responses will be used to demonstrate 'how much students learned' which is an item in the end-semester course evaluation that the students were required to address. It is also important to mention here that after a couple of class sessions a new activity emerged to complement the listserv

discussions. Students expressed the need to engage in an in-class discussion prior to taking the online quiz. They felt that posting, responding, and validating questions using the listserv was not sufficient in preparing them for the online quiz. As a result, an in-class discussion about these questions and their answers was facilitated by the instructor at the beginning of every class session. Students also reflected on this activity in their statements. Below are excerpts from these statements on each of the online activities as well the in-class discussion.

Listserv Discussion

'I liked the idea of generating our own questions about the topics we read and having our classmates answer them. In this way we could bring ideas that we felt were interesting or important about the subject to the group and we could see what others had to say through their answers.'

'I did not feel that these question and answer sessions could be considered a true discussion. I don't recall there being any third party involvement in any of the questions/answers posted.'

'The idea of selecting and posting two questions which typify the content of the article(s) was also helpful. Selecting important questions is a type of synthesis-thinking. A reader who doesn't think synthetically is not reading actively and will not retain much of what is read.'

'One thing that I find unusual is its very nature of being asynchronous. Often students misunderstand each other because they have long forgotten what other students' arguments were before they hit on the next topic. I would rather see this discussion carried out synchronously on a chat line as the class size is quite small. This will certainly bring about other problems in practice as most students are studying part-time while engaged in their professional jobs full time however it might be a more effective learning experience.'

'I found the listserv discussion to be the most enriching … It was very interesting to see the different questions that each of us developed. I also enjoyed the variety of topics each of us covered. It was an interesting way to get a more in-depth look into a point of the chapter that I may not have been drawn to.'

'Early in the semester it was very demanding to keep up with the reading and post questions, answers, and verifications. It was a constant pressure on the mind that you needed to check the listserv to see who posted what so you can respond and who answered your question so you can verify it.'

'A lot of the questions were rather simple and did not require higher-order thinking skills. People were intentionally looking for easy questions because they knew the questions would be on the quizzes and then on the final exam. It is also very easy to compose and answer a question without actually reading the whole chapter.'

'I think I would like to have more discussion on the listserv. Just posting questions did not seem to really use the best part of the listserv to its best ability.'

In-class Discussions

'The in-class discussions which evolved after several weeks of readings was a positive thing. Giving the class an opportunity to voice opinions regarding aspects of the readings promotes active learning. Voicing one's thoughts helps to codify and structure them. Also, hearing others' viewpoints causes re-examination of one's own ideas–always a healthy activity.'

'Eventually we began discussing the questions and ideas before each quiz in class. I felt these discussions enhanced what we did throughout the week, while the quizzes did not offer the same enrichment.'

'I found the in-class discussion to be very helpful and enlightening. It should be moved partially to

an online discussion form.'

Online Quizzes

'Rather than on-line quizzes, I would have preferred to have been graded on the quality of my contributions to the in-class discussion which happened prior to taking the online quiz. I think that such an approach would have caused all the students to examine and review the articles more thoroughly–and learn more from them.'

'I found the multiple-choice questions easier to answer online than the essay type. There is so much typing to do and as a student, I would rather write on paper when under the pressure of taking a quiz.'

'The quizzes, although certainly an evaluation tool, I do not believe enhanced my learning. Since they were the exact questions we developed during the week through our listserv, I did not feel that the quizzes tested our learning and comprehension of the information.'

'It became difficult after a while to keep the facts straight with all the different frameworks and models that we were reading about therefore the quizzes were not very effective in helping us discriminate between the many concepts underlying these frameworks.'

Online Resources

'I made very little use of these resources, accessing them only two or three times during the term. Whenever I needed the syllabus, I was able to reference the paper copy to obtain the information that I needed. The instructional resources available from the course home page were of minimal use. I saw no compelling reason to view, for example, the PowerPoint presentation on the Instructional Framework.'

'The online resources page had a few items for us to investigate. One of the resources offered our WBL dimension reviews. I thought this was a great idea if others posted as well.'

'Other than at the very beginning, I seldom accessed the pages except to link to Khan's framework or the Levels of Interactivity.'

'An idea for this page is to include a bulletin board posting section where we as students could post site findings and other resources. Going back to our diverse experiences, I know we have discovered a great variety of resources and this would be a wonderful common area to share them.'

'Overall, I learned a lot by browsing through the instructional resource pages to utilize and locate educational resources and discriminate between educational and non-educational sites.'

'It is very good to have both options, online information and hardcopy by printing online information.'

End-semester Course Evaluation

This was a standard quantitative assessment based on a scale of 1-5 that rates the instructor as well as the course on several criteria. Since this case study is about evaluating the course organization and structure, only items related to the course will be discussed.

Students were required to rate the course in terms of:

2. its relevance and importance
3. relationship to the syllabus
4. consistency of assignments with course objectives
5. text and/or class materials

6. how much they learned
7. overall rating

All nine students completed this assessment during the last class session. The results were not as anticipated by the instructor. This was a new course in its experimental stages which required the use of online technologies for the completion of learning activities and students had no benchmark for comparing expectations. The course was rated high in terms of its relevance and importance to the field however the other items received a range from satisfactory to unsatisfactory ratings. Item 5 received a satisfactory rating and the following excerpts from students' reflection statements (in response to question 2 of the statement) demonstrate their learning about the pedagogical aspect of WBI which was an important goal for this course. The question asked students to reflect upon the many frameworks and models that were presented in the readings and to select a favorite framework for the development of WBI or to design their own. Here is how some students addressed this question:

'The Event-Oriented Design (EOD) model proposed by Thomas M. Welsh in chapter 19 of Khan's WBI book (1997) attracted me more than the other formal models and frameworks mentioned in the readings. The EOD model was down-to-earth and proscriptive, rather than an abstract statement of certain theoretical notions. There were actual steps described for implementing the model. By far, though, the most attractive aspect of Welsh's ideas was that his model made it "a relatively simple matter to enable the same events in a more traditional campus environment." (Page 164) In my current community college situation, the development of on-line courses is proceeding in fits and starts. I think that Welsh's model will fit that environment well, allowing even for a partial on-line implementation in the context of a regular classroom-based offering. Also, as Welsh points out in his conclusion, I may be required to teach a classroom-based offering of a given course (such as statistics) while developing and making available an on-line version of the same course. The EOD model allows for the flexibility demanded in that situation.'

'Schrum's framework is cohesive and easy to comprehend. It includes four major areas for consideration in the design and development of WBI: pedagogical, technological, organizational, and institutional. However aspects like online support, interface design, and resource support should be incorporated or addressed under the technological dimension and aspects concerning management of online instruction should be incorporated under the organizational dimension.'

'The two frameworks that made the biggest impressions on me were Khan's WBL framework and Reeves and Reeves interactive learning dimensions. I think Khan's framework is useful as a checklist for helping authors determine what components and features they may need in their particular WBI program, and reminding them about the necessary, but less important details of information that aid the learners who are taking the course online such as navigational tools. Reeves and Reeves model however came across as being the most down to earth, comprehensible explanation of ways to approach the design and evaluation of WBL. The model does not offer cut and dry solutions as to how to design the *best* course or module, rather how to determine what type of instructional strategy, what components of the Web, etc., an author could use to design the most appropriate instruction for his/her purposes.'

'In designing my own model I would include three categories: content or pedagogical, technical, and Web components. In the content or pedagogical category I would include accurate content, course requirements, objectives, and assignments. I would also include ethical issues associated with creating an online course making sure that the information is presented in a clear and unbiased way so as not to offend anyone. Instructors should make sure that proper netiquette is used and that their design approach is clear. This includes varying the material to meet the needs of different learning styles. Students should also be allowed to give anonymous feedback about the site. The technical category would include student support and instructor/facilitator support. The Web components category would include usability issues, interface design, navigation structure, and hyperlink structure and accuracy.'

As demonstrated in the above excerpts, students were able to synthesize their knowledge on WBI and go beyond the information given to provide their own rational for selecting their most-preferred framework or design their own framework for guiding the development of WBI. Although transfer of learning was evident, the overall rating of the course (item 6 on this evaluation form) was unsatisfactory. A positive

correlation of this rating with the ratings on items 2 (relationship to the syllabus), 3 (consistency of assignments with course objectives), and 4 (text and/or class materials) was apparent. The rational for this correlation is evident in our discussion of our findings and conclusions below.

Findings & Conclusions

Courses in WBI are at the forefront of every higher education institution and the need for guidelines on how to design, develop and implement such courses is eminent. This analysis revealed several important findings that formed the basis of a set of guidelines for designing, developing, and implementing a course on WBI. According to the Australian National Training Authority (ANTA), 'an emerging pattern for the development of online courses is that of a staged and incremental process where the focus for developers is more on understanding the potential of the technology and exploring its features (March, 98).' This course was designed to communicate to students that WBI involves several dimensions other than the technological. In particular, course activities were designed to address a variety of Web-based frameworks and instructional strategies that are integral to the design, development, and delivery of online courses. Evaluating these activities resulted in guidelines that could be used to improve the delivery of courses designed to teach about WBI. The framework used to present these guidelines will be the instructional activities themselves. The evaluation results and the ensuing recommendations for each activity will be discussed below.

Presentation on Special Topics

This was described as a positive learning experience from the standpoint of the participant observer. Bringing in experts to present on special topics helps contextualize learning and allows students to interact with the experts meaningfully. It is therefore strongly suggested that expert modeling and interaction with experts on relevant topics be included in the design of such courses. Expert modeling and interaction with experts may be conducted in face-to-face settings if feasible or may be incorporated as an online activity through some form of Computer Mediated Communication.

Evaluating Existing Online Courses

This activity was described as an excellent learning experience by the participant observer and was also discussed by students in their reflection statements as being instrumental in guiding the design and development of their WBI prototypes. The activity required that students use the WBL framework to evaluate existing online courses and synthesize their findings in a report which was posted on the Web. In doing so, students were engaged in critical thinking skills. Posting the reports on the Web also provided examples that can be shared amongst students. These examples can be used for modeling, discussion, or review. Based on these findings it is suggested that engaging students in higher order thinking skills through the evaluation and synthesis of existing online courses and modeling these efforts by posting their work to the Web is critical to enhancing their learning of WBI.

Teamwork

Teamwork was a fundamental component of this course and was evaluated by the participant observer. It was noted that graduate students frequently have many time consuming obligations such as work and family which makes scheduling outside of class group meeting times for assigned group projects very difficult. Students therefore should be encouraged to use electronic communications for group meetings as much as possible. It was also suggested that the instructor should be copied on group communications and should take a larger role in facilitating and monitoring group activities. It was also noted that graduate students often have differing backgrounds and areas of interests and that getting group members to agree on project topics is difficult. Offering a list of pre-selected topics for students to choose from may expedite this process.

Online listserv

Posting, responding and validating questions through an online listserv was also a fundamental component of this course, the objective being to provide students with a means of interacting with the

reading material and enhancing group communication. This activity was evaluated by the participant observer as well as the students through their reflection statements. Although most agreed that generating questions was a reflective activity which engaged students in higher level processing of the material an provided multiple perspectives of the content, the results were a mix of positive and negative comments. The following suggestions were noted to improve this activity:

- Protocols for online postings and/or discussion need to be well established.
- Online discussions and the effectiveness of online protocols needs to be continuously monitored and changes rendered as revealed.
- Synchronous rather than asynchronous discussions should be considered in order to reduce the anxiety level of having to 'go online' several times per week and to encourage real time interaction.
- Students should be encouraged to discuss material and offer opinions about topics or other posted questions on the listserv in addition to simply posting, answering, and validating questions.

In-Class Discussion

Although this was not a planned but rather an emerging activity, the consensus was that it was a very positive learning experience which further enhanced the knowledge of concepts articulated in the readings and helped reduce the anxiety that preceded taking the online quiz. Students were able to ask questions about the readings and explain to others how they generated their quiz questions and what they were looking for as responses. This provided the comfort zone that was lacking on the online listserv. The absence of a 'third party' intervention on the online listserv as one student put it created an anxiety level that negatively impacted the learning process. It is strongly suggested therefore that an open discussion forum be used to complement a prescribed activity and that the discussion be facilitated by the instructor to provide the necessary learning guidance for students.

Online Quizzes

Generally the comments on the online quizzes were negative. This activity was perceived as anxiety producing and cumbersome in terms of online requirements. The participant observer noted that quizzes should be given less frequently and at the end of the class after students had been given the opportunity to discuss the material. Students echoed these comments in their reflection statements and added that the online format was limiting due to time constraints and the types of questions asked. Most of the students resorted to multiple-choice type questions which were easier to generate for the online listserv but difficult to answer due to their inflexible nature specially when the material became increasingly complex with the many frameworks and concepts presented. The few open-ended questions that were included in the quizzes also presented some difficulties for the students in terms of typing and space limitations. Students did not think that the online quizzes enhanced their learning experience. It is therefore not recommended that this activity be used in a course on WBI. Instead, student generated questions on the readings followed by a discussion (online or in-class) that is facilitated by the instructor was perceived as a more effective learning experience.

Web-Supported Resources

Mixed results were expressed regarding the usefulness of online resources to support the instructional process. It is important to keep in mind in this context that this course was conducted in a traditional format where students met face-to-face on a weekly basis. Had the course been conducted partially or fully online, the authors feel that the usefulness of the online resources would have been more prevalent. Some students did not feel the need to visit these resources unless they were instructed to do so as part of a specific activity. Others enjoyed browsing the many sites provided and most liked the convenience of having access to the syllabus and other course material as needed. One suggestion was that students be responsible for adding to these resources and that a designated area be made available for this purpose. We feel that this is a very important suggestion which enhances generative learning activities by allowing students to contribute to the course content. As discussed above, posting students work on the Web provides a shared resource for the group and an opportunity for students to learn from other students. Finally, we feel that since the instructor also provided print-based copies for most of the class assignments and activities some of the Web resources may have been regarded by the students as

redundant.

The World Wide Web does not have the intrinsic ability to teach however it can provide features that are conducive to learning and instruction (Dabbagh, 1998). Educators and instructional designers are able to take advantage of these unique features to create meaningful instructional environments where learning is fostered and supported. Although some Web-based features such as synchronous and asynchronous communication, unfiltered searchability, global accessibility, and hypermedia interactivity are inherent to the medium, the learning activities that they enable are critical to the design of effective instruction and must be grounded in learning theory irrespective of the medium used. Courses in WBI should demonstrate that in order for WBI to be effective, it must be pedagogically driven, dynamically designed, action-oriented, and content specific.

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Nada was recently awarded a technology fellowship in the Center of Instructional Advancement and Technology (CIAT) at Towson University in which she designed and developed a problem-based learning environment that exposes students to the contextual and problem-solving nature of the process of Instructional Design. This research effort is on-going with the goal of building a Web-supported database of problem-based case scenarios to support the teaching and learning of Instructional Design through authentic contexts. Currently, she is working on evaluating the pedagogical effect of traditional courses that have been redesigned for online delivery using Web-based Course Authoring tools. She recently published an article and a book chapter that articulate her findings on this issue.

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Tracking the change process: Adopting Web-based teaching in an education program

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Abstract

The Faculty of Education at the University of Prince Edward Island has recently made a commitment to explore and implement Web/resource-based learning in course offerings, where pedagogically appropriate. This decision has a number of wide-reaching implications which, as a group of instructors, we continue to explore. The focus of this paper is on how instructors have explored Web-based learning environments, conceptualized changes to programs and courses, and engaged in the learning process themselves.

The Faculty of Education at UPEI offers a post-degree Bachelor of Education program, as well as a thesis-based Master of Education program. The first program tends to attract recent graduates of Arts or Science programs, while the second is oriented toward teachers in the field who wish to further their education. We have found that the former group is arriving at our doors with many more technology skills than students of previous years. These students have strong expectations that information technology will be an integral part of their education as pre-service teachers. The teachers enrolled in the Master's program are already working within a school system which has a strong commitment to information technology. These teachers have shown a growing expectation that information technology, and particularly Web-based learning, will be essential in their own learning.

Educational use of information technology on Prince Edward Island itself is in the throes of change, as new information technology documents and information literacy documents are being written which support the integration of technologies into the teaching and learning contexts of Island schools. School Web pages are proliferating daily; province-wide telecommunication projects have been implemented in a number of schools. Every school in the province is connected to the Internet, and also connected to each other via the Department of Education network. The use of technology in teaching is supported by the PEI Department of Education from grade 1 through grade 12.

This is the context within which the instructors at the Faculty of Education work, as they prepare pre-service and in-service teachers to utilize Web-based learning and other technologies in their teaching. The Faculty of Education mounted a pilot project to explore the use of a Web-based learning environment in education courses. The learning environment chosen for this initiative was WebCT. Even though there was faculty agreement in principle to the inclusion of Web-based learning where appropriate, there were many issues to be dealt with as we moved through the project. These included infrastructure issues (Who is the site administrator for WebCT courses? Who pays the licensing fee?); pedagogical issues (What is an appropriate use of Web-based learning in education courses which are offered face-to-face?); human resource issues (How do individual professors learn to use and integrate the Web-based environment into their teaching?).

The focus of this paper is on sharing the answers that were developed to these issues. It explores the support mechanisms in place during this project, and shares strategies and insights that were gained about teaching and learning in Web/resource-based learning environments. This paper addresses the issues of instructors discerning how to implement Web-based learning in their teaching, without compromising their pedagogical principles.

Tracking the change process: Adopting Web-based teaching in an education program

Introduction

The Faculty of Education at the University of Prince Edward Island (UPEI) recently made a commitment to explore and implement Web-based learning in courses, where it is deemed to be pedagogically appropriate. This decision proved to present a number of issues that as a Faculty had to be

resolved. In the interest of facilitating faculty members' adoption of Web-based learning components in their courses, a research grant was applied for and received from the Webster Foundation Fund for Innovation at UPEI. This grant allowed a course release for one faculty member, as well as the short term hiring of a technology facilitator to support this effort. The intent was to expedite the implementation of Web-based components within education courses through the coordinated efforts of faculty members, the technology facilitator, and the project leader. The focus of this paper is on how instructors have explored Web-based learning environments, conceptualized changes to programs and courses, and engaged in the learning process themselves.

The Context

The Faculty of Education at UPEI offers a post-degree Bachelor of Education program, as well as a thesis-based Master of Education program. The first program tends to attract recent graduates of Arts or Science programs, while the second is oriented toward teachers in the field who wish to fur the r their education. We have found that the former group is arriving at our doors with many more technology skills than students of previous years. These students have strong expectations that information technology will be an integral part of their education as pre-service teachers. The teachers enrolled in the Master's program are already working within a school system which has a strong commitment to information technology. Similarly, these teachers have shown a growing expectation that information technology, and particularly Web-based learning, will be an integral part of their graduate education.

The use of information technology in classrooms on Prince Edward Island is evolving. New information technology and information literacy documents have been recently developed by the PEI Department of Education. These have supported the integration of technologies into the teaching and learning contexts of Island schools. School Web pages are proliferating daily; province-wide telecommunication projects have been implemented in a number of schools. Every school in the province is connected to the Internet, and also connected to each other via the Department of Education network. The use of technology in teaching is supported by the PEI Department of Education from grade 1 through grade 12.

This is the context within which the instructors at the Faculty of Education work, as they prepare pre-service and in-service teachers to utilize Web-based learning and other technologies in their teaching. The Faculty of Education mounted a pilot project to explore the use of a Web-based learning environment in education courses. The learning environment chosen for this initiative was WebCT, which had been proposed by instructors at the Information Technology Education Center (ITEC) as the Web-based learning environment of choice at UPEI.

Even though there was faculty agreement in principle to the inclusion of Web-based learning within courses where appropriate, there were many issues to be dealt with as we moved through this project. These included infrastructure issues (Who is the site administrator for WebCT courses? Who pays the licensing fee?); pedagogical issues (What is an appropriate use of Web-based learning in education courses which are offered face-to-face?); human resource issues(How do individual professors learn to use and integrate the Web-based environment into their teaching?). Underlying all these issues was one major the me: the resolve of the Faculty of Education to engage with the issues of technological and pedagogical change.

Rationale

Michael Fullan (1999) suggests that there are a number of lessons to be learned in dealing with change. One lesson he proposes is that conflict and diversity are our friends (p. 22). When we explored the attitudes of the faculty toward utilizing Web-based resources in their teaching, we encountered a range of opinions. We did not encounter consensus. However, we did find that faculty who had supported the IT Strategic Plan earlier in the academic year were willing to entertain the idea of including Web-based resources in their courses. There were a number of faculty who voiced critical questions, and who did not accept the statements of workshop leaders at face value. We found these dissenting voices very important–they required us to rethink, restructure–to explicate the rationale for involving faculty in this venture into Web-based learning. We learned to value the diversity of beliefs about the role of Web-based learning in our pedagogical practice.

We also found that it was difficult to maintain an overall perspective on what was happening throughout the project to professors, courses, research assistant and administration. There were too many unknowns, for us to be able to chart the entire course out in advance. We found that we had to accept a certain degree of uncertainty, and begin to develop the ability to "operate on the edge of chaos" (p. 24). Fullan advises, "Do not try to micromanage change through lots of rules, rigid structures, and for mal channels of communication. Rather, setup a system of people-based learning, framed by a few key priorities and structures" (p. 24). We conceptualized the changes we were undergoing as fitting within this framework of (1) key priorities, (2) structures, and (3) people-based learning.

Key Priorities

The key priorities in our case were the goals to which faculty had agreed in our strategic Information Technology (IT) plan. These included a commitment to:

- integrate Information Technology into teaching, learning, research and outreach services.
- collaborate with internal and external partners on Information Technology initiatives.
- continue developing our own Information Technology expertise in order to provide leadership in this area.
- increase accessibility of our various program offerings by making use of information technology
- create and nurture an environment for continuing research on integrated uses of information technology .

When translated into action, one implication of these goals was that faculty would integrate Web-assisted learning into courses where appropriate, which led faculty to commit to the implementation of this Web-based learning project.

Structures

The Faculty of Education had an IT committee in place which initially sponsored the adoption of the IT strategic plan. The committee was composed of four early adopters of technology, who were already utilizing the Web in their teaching. One instructor had already taught Web-based courses for diploma students, a second had developed a Web-based Master's level course. The third member of the committee had taught advanced technology, including HTML coding, to pre-service teachers. The fourth committee member taught the core technology course for all students in the B. Ed. program. These early adopters did provide a model for other faculty members of how education courses might in fact, be offered using WebCT.

The first step in the development of faculty expertise was the provision of a number of workshops. Several were provided by ITEC to introduce interested WebCT to interested university and college faculty. Other workshops were provided for instructors in the Faculty of Education to familiarize our faculty with the new IT facilities in the building: the University had given a grant to the Faculty of Education for the development of a "smart classroom" as a faculty and university resource. The new hardware and software were demonstrated–professors had an opportunity to experiment with these tools in an informal workshop atmosphere. For example, one exercise was an online jigsaw activity, during which different instructors read one of several journal articles about Web-based learning, posted their comments about the article on the WebCT bulletin board, and then responded to each others' messages–thus using the Web-based tool for authentic learning and dialogue. These articles read by the instructors, as well as some basic instructions on the use of the digital camera, the scanner, and other tools, were provided in hard copy in a binder for each participant in the workshops. This strategy ensured that each instructor had his or her own paper "tutorial" whenever needed.

At the Faculty of Education, we conceptualized a range of possibilities for the use of WebCT in our classes. We found that our conceptualization fit the typology developed by Eastmond (1998)quite well, although his typology was based on online instruction in distance courses and all of the courses in our Faculty to this point are face-to-face. Eastmond's Type I course is a traditional class supplemented with Internet activities–which foster "experiential and activity learning (p. 35). Some of the Web-based

activities which define a Type I course would be email exchanges with other students and with the instructor, online library research , electronic journals, and Web sites (p. 34). These activity components are included in many of the courses developed at the Faculty using WebCT: students have learned to access the online electronic journals through Ebscohost, to use the Bobcat online library search, to explore Web site hot lists and Web quests placed within the course structures.

Some instructors are actively pursuing the use of computer conferencing as an integral component of their courses. If and when conferencing becomes the main method for delivering these courses, we are edging toward delivery of a Type II course. A Type II course requires that the Web become the main vehicle of course delivery and student-instructor interactivity. In practice, we would see much more student interactivity via the Web through active participation in computer conferencing. The commitment has been made by faculty through our IT action plan to develop one Web-based elective per year at both the Master's and the diploma level. The WebCT project is our first iteration of Web-based learning for our education students.

People-based Learning

Within the context of the Web-based learning project, we believed that the most effective way to facilitate change was by providing learning opportunities for our faculty. These opportunities occurred in the workshops, in the modeling of actual Web-based learning within courses, and in mentor relationships.

In our faculty, one instructor offered a Master's course as a face-to-face class, but his entire course was available through WebCT. This situation supported the change process in a number of ways:

- Professors had an opportunity to see a course in action, and explore some of the options that they might utilize in their own courses.
- They heard the enthusiastic responses of our Master's students, who were teachers and adult educators working on Prince Edward Island.
- There was a gentle push-pull effect for faculty. The Master's students were so enthusiastic about WebCT and how it might be used, that there was pressure on other faculty members offering Master's courses to implement Web-based components in their teaching.

The group of 21 Master's students were very positive about the potential uses of WebCT. They were surveyed twice: once during the first class of the course, and a second time during the last class meeting. Even though the class took place entirely face-to-face once a week, students found that use of the Web-based resource allowed them to maintain contact with their colleagues. They firmly expressed the view that they hoped to have this technology available to them throughout their program.

> Having WebCT was wonderful! I enjoyed the bulletins and found the email helpful. The course notes were excellent. I was able to listen during classes -rather than need to write lots of notes and I appreciated this. Being able to submit assignments for feedback was terrific. My understanding of course material was enhanced because of WebCT. (Lindsay, post-course survey)
>
> The WebCT component of this course was wonderful; as part time students who only saw each other once a week, it allowed us to communicate and develop a sense of unity. We didn't have to be at the university to talk to our professor at the library to do research . Course notes were helpful to prepare for classes. Calendar kept us up to date. Submitting drafts electronically was helpful - comments were prompt which made revising timely. Definitely recommend this for the future. (Samuel, post-course survey)
>
> I certainly hope this is available for our other courses! (Celine, post-course survey)

Students developed expectations regarding communication and learning on the Web which they anticipated would continue throughout their program. These responses to the use of WebCT as a communication and learning tool were shared with all of the instructors in the Faculty. At subsequent

meetings of Master's students with professors, the issue of WebCT was frequently raised as students stressed their desire for access to this mode of communication.

Another powerful change strategy was the development of a strategy to provide just-in-time training to faculty (Driscoll, M. , 1998; MacArthur, Pilato, Kercher, Peterson, Malouf, &Jamison, 1995; Mincemoyer & Thomson, 1998; Padjen, 1997; Perna, Lerner, &Yura, 1995; Rogan, 1997). The hiring of a research assistant/technology facilitator was an integral part of the plan to implement Web-based resources in Faculty of Education courses. The facilitator we hired to work with the faculty was a recent graduate of our teacher education program who planned to work as an educational software developer. He was personally committed to developing expertise in assisting others to develop Web-based course resources. We conceptualized the facilitation component of the WebCT project as a team effort. The team was composed of the technology facilitator, the team leader, and individual professors: the actual composition of the team shifted as work on various courses was completed and new professors joined the team for work on their course(s).

The technology facilitator developed expertise in the vagaries of WebCT and was able to share this new knowledge with individual professors just-in-time, when they needed the information. As individual professors made requests for modifications in the way WebCT features were organized, our facilitator experimented with the Web environment, to see if we could arrange the structures to reflect the constructivist, holistic pedagogy/andragogy espoused by our faculty. We were able to make some modifications, but other solutions eluded us. for example, we wanted to allow students to submit online assignments, but many of these had to be organized under the heading "quiz" even though that was not what we intended. When students submitted an essay online, professors could make comments on various portions, but not within the body of the student's writing. These were several challenges posed by professors who utilized WebCT in their courses.

As the project continued, the technology facilitator demonstrated to the members of our faculty how to choose WebCT tools for their courses, how to input a new list of students in the course for a new term, how to upload their own course materials to the WebCT server. Written directions were provided for these new skills as well as an opportunity for guided practice. Throughout the nine month project, the four early adopters of the WebCT became skilled at WebCT course development. This allowed the faculty to continue to have supportive instructors with more refined skills in the development of Web-based course components even after the project was completed, and our technology facilitator was no longer available to the faculty.

Insights into Teaching and Learning

Support by the administration of the faculty and university was critical for the success of this project. This support was visibly demonstrated by the provision of a financial grant from the Webster Foundation to expedite the process, and by the strong encouragement of the Faculty of Education administration throughout the development and implementation phases of the project.

The provision of a course release for a faculty member to engage in planning, team meetings, and research into the process was a essential component of this project. This faculty member facilitated the continuation of the change process within the faculty, ensured a collective understanding of the progress of the project, and provided leadership as the project evolved.

The hiring of a technology facilitator was necessary for the successful development of the project. The facilitator focused on the dissemination of information about the Web-based learning environment, development of Web-based learning course components for individual professors, and the solution of technical problems. It was critical for the facilitator to develop supportive relationships with the faculty as they began to implement changes in more traditional course delivery.

Faculty commitment to the project was necessary for any change whatsoever to occur, for instructors develop and deliver their courses in the manner they believe most appropriate. Faculty members were willing to consider and undertake the inclusion of Web-based components in their courses, because of their commitment to the use of appropriate educational strategies for their students.

The framework utilized in this project: key priorities, structures, and people-based learning: afforded an appropriate means of conceptualizing change within the Faculty of Education. This framework provided one means of facilitating and describing the process of change throughout the life of the nine month project and beyond.

Summary

In the Faculty of Education, University of Prince Edward Island, a commitment was made to integrate Web-based learning into courses where this mode of learning and communication would be appropriate. Utilizing the Web environment of WebCT, the faculty pursued this goal vigorously. Many of the infrastructure issues alluded to earlier such as naming the site administrator, and deciding how the site licence would be negotiated were resolved over time, with coordination among ITEC, the Faculty of Education, and the University. The human resource and the pedagogical issues involved in a transition from strictly traditional face-to-face teaching, to the inclusion of Web-based learning in our courses were a challenge. Addressing change by focusing on our key priorities, on the structures of the change, and on the people-based learning involved in the change, provided a comprehensive model for development and implementation of Web-based learning in education courses.

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Web-based instruction: How effective is it? A New Zealand Perspective

Joan Naves Gajadhar, The Open Polytechnic of New Zealand, New Zealand

Abstract

In the twenty first century there will be a paradigm shift from information workers to a world dominated by knowledge workers. This is a common prediction, but what does it mean for educators? Information per se, has no intrinsic value. Transforming enormous amounts of data or information into knowledge is a concern. In this paper, I will be exploring the ramifications of this prediction on tertiary learning.

Already this shift is having an impact on public demands for higher learning. Distance education, for many years considered a poor relation of traditional, campus based institutions is becoming de rigeur with educational institutions determined to keep pace with change. Online instruction, which can be perpetual and life long, has a potential to develop knowledge workers, and it has an allure for the public. An increase in computer usage with the advent of easy to use Web browsers sees literally thousands of courses being offered via the Web. Online learning is now big business We are rapidly moving from instructor- based, traditional learning to student centred, interactive Web-based instruction.

As tertiary students become inveterate users of the Web, there are both opportunities and concerns for educators. We have within our grasp enormous opportunities to enhance and support learning with technology, but I have a concern that by jumping too quickly on the technology bandwagon, the quality of learning and needs of learners can be a distant second in a rush to embrace technology. This raises a question. How effective is Web-based instruction for long distance learners? And is it always the most effective method?

This paper examines the implementation of Web-based instruction for distance learners in an open learning environment. In 1997 The Open Polytechnic of New Zealand embarked upon an Internet Project to determine the viability of providing courses online for its thirty thousand, adult learners who were already committed to learning 'at their own time and in their own place.' Print-based learning provides the major means of gaining further qualifications for the majority of these largely part-time, working students. The intention of the pilot project was to develop an accessible, cost-effective delivery as an alternative or complement to traditional distance learning. With student support mechanisms such as Email, Freephone, and ListServ already in place, the Open Polytechnic redeveloped three of its degree level computing courses for delivery on the Web These courses were specifically selected as they were technology-related, already required students to do their coursework on computers, and a majority of students had access to the Internet. During the design of the courses, the possibility of the courses going online was considered but not planned as the primary mode of delivery. Each of the courses was offered in dual mode with print based materials sent to students and online versions available with passwords for access.

The purpose of this study is to examine the Project over this introductory one year period to appraise the effectiveness of online study in meeting established criteria set for conventional delivery. First the concept of life long learning is examined, followed by a discussion on the rationale and procedures of this project, using examples of the strategies used. Recent research at the Open Polytechnic involving student questionnaires and evaluations of the courses, is explored next, coupled with interviews with staff involved in the project. Organisation and administration of the courses is highlighted with a focus on enhancement of student learning The paper concludes by reviewing the project, its challenges and effectiveness as a platform for future online learning.

Editor's Note: **Technical difficulties on our part have prevented us from including this full paper in the print proceedings before they go to press. We regret this inconvenience. The author's extended abstract is included here, and the paper is a part of the NAWeb'99 proceedings; please review the full paper on the conference Web site at http://www.unb.ca/wwwdev/naweb99/**

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Joan is American born,(Pittsburgh, Pennsylvania) with a Canadian father(Saint John, New Brunswick), but makes her home in New Zealand. She admits to having an affinity with all three countries.

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BPM Online: A Case Study Describing the Development and Implementation of an Internet-Based Undergraduate Business Program at Nova Southeastern University

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Abstract

Nova Southeastern University is the largest private university in the State of Florida. Chartered in 1965, it has long been known for it commitment to adult education at off-campus locations. NSU currently has over 15,000 students located in many states and several countries including Canada. Graduate schools include law, dentistry, medicine, psychology, business, and education.

The Bachelors of Professional Management (BPM) is an upper-level completion program which has been offered at Nova Southeastern University to students at many off-campus sites for the past 20 years. The BPM provides the junior and senior 66 credits with a management major to students who have typically completed an associates degree in a wide variety of areas. On-ground students take classes evenings and weekends all over the State of Florida, Nassau, Jamaica, and Panama.

In 1998, BPM Online premiered after a one-year pilot program. BPM Online provides the same educational opportunity as the standard BPM program to students who cannot attend class even at times and locations convenient to adult students. This case study examines the administrative, technical, and faculty issues involved in designing, developing, and implementing a Web-based format for the BPM program which allows students to complete 100% of their program requirements in an online environment.

While Nova Southeastern University has been recognized as a distance education pioneer for many years as well as a pioneer in online programs, BPM Online is NSU's first undergraduate degree program to be offered online. Significantly, it was developed and is taught and controlled by full time faculty who are dedicated to assuring that identical exit compentencies are achieved by online students as by classroom-based students.

BPM Online: A Case Study Describing the Development and Implementation of an Internet-Based Undergraduate Business Program at Nova Southeastern University

Introduction

Nova Southeastern University was chartered in the State of Florida in 1965 as Nova University. From the beginning, the University's major focus was on graduate education at times and places convenient to adult learners. As the university developed, its masters and doctoral programs became supplemented by undergraduate programs first offered in conjunction with the New York Institute of Technology. By 1980, the Farquhar Center for Undergraduate Studies added a full time day program for traditional aged college students to its large, existing population of evening and weekend students.

In 1995, Nova University merged with Southeastern University of the Health Sciences and became Nova Southeastern University. By doing so, NSU became the largest private tertiary institution in the State of Florida and among the largest 30 in the country. With over 15,000 students, NSU has graduate programs that now include schools of business, education, psychology, law, computer and information sciences, dentistry, pharmacy, and medicine.

The Farquhar Center now consists of two distinct programs: the College of Liberal and Professional Studies which serves about 1,000 students, mostly 18-22 year olds and the College of Career Development which serves over 3,000 adult students largely in the fields of business and education. These students are located all over the State of Florida, the Bahamas, Panama, Jamaica, and Louisiana.

According to the Farquhar Center bulletin,

The College of Career Development is designed for working and professional adults. Courses are offered in the evenings and on weekends on campus and at institutional, industrial, and other off-campus locations convenient to students. Although course content meets traditional educational requirements, courses are scheduled to meet the needs of employed students and are taught by university professors as well as knowledgeable professionals in the community. (1998-1999 Catalog, p. 3)

Most career development students are full-time working adults with multiple responsibilities including work and families. They demand a high level of relevancy in their studies and convenience in logistics and services surrounding their educational programs. NSU has made educational convenience a cornerstone of its philosophy from the beginning, long before the average educational institution was thinking about taking university studies to the student. In recent years, however, what was once controversial and unusual, i.e., off-campus delivery systems, has now become common place. Students continue to look for alternative educational strategies to fit in with their increasingly complex lifestyles.

The Changing Face of Distance Education

In the 1970s, NSU was among a very few universities taking education to adult students. They were considered controversial by detractors and cutting-edge by supporters. Distance education, in those days, consisted of a handful of institutions who offered off-campus courses. Now, distance education has gained new meaning–mostly referencing some type of computer mediation. This trend, while growing, is relatively new. In 1993, Peterson's guide to U.S. colleges reported only 93 "cyberschools." By 1997, this number had risen to 762! (Gubernick & Ebeling, 1997)

Says Peter Drucker, widely seen as the most important management guru of the last 50 years, " Universities won't survive. The future is outside the traditional campus, outside the traditional classroom. Distance learning is coming on fast." (Gubernick & Ebeling, 1997)

This paper chronicles the development and launching of a program which itself reflects the changing nature of distance education–the Bachelors of Professional Management Program (BPM) which began in 1978 as an on-campus and off-campus program and now exists additionally in a 100% online format. Before discussing the development effort of the online program, however, a description of the BPM program itself is in order.

The Bachelors of Professional Management (BPM) Program

The Bachelors of Professional Management Program is a 66 credit upper-level completion program which originated in the late 1970s. Its primary purpose was to service adult students who had already completed an associates of science degree or the equivalent. The typical student did not have a business degree but majored in a technical field such as nursing, electronic technology, or respiratory therapy. The one common element among these students was their desire to work their way into management in whatever their chosen field. Thus the nursing student may have attained the rank of nursing supervisor or at least aspire to that rank. The electronic technologist may have achieved a supervisory title. The problem at the time for the A.S. degree holder was that they he or she could not proceed into a bachelors degree without doing a lot of lower level courses first.

NSU's BPM program changed that by requiring only 15 credits of liberal arts having been completed at the lower levels. In addition to a management major provided in NSU's upper 66 credits, language, math, public speaking, and humanities courses were built into the junior and senior experience. Thus A.S. students could immediately enjoy junior standing and avoid having to retake lower level courses.

Other distinctive characteristics of the BPM program, then and now, are that it is offered in a cluster format, it can be completed in a 27-33 month time frame, and students progress through the program in a lockstep fashion. The cluster is simply a cohort of typically 18-25 students who take the entire program together. The advantage of the cohort is the solidarity of the group and the support system that typically emerges. Students tend to take the program with other students who work in their companies. They

encourage each other to continue through tough times and they form study groups which tend to last throughout the program. The 27-33 month time frame depends on the format of the particular cluster. Most BPM clusters attend class one night each week from 6-10 p.m. and all day every other Saturday. Other clusters choose to have class on a Friday night and Saturday format, while still others, notably in Jamaica and Panama, take classes on Saturdays and Sundays. The format is flexible and designed to serve the student body. One group in Freeport, Bahamas, for example, consisted of a number of Seventh Day Adventists who chose to take class Saturday nights and all day Sundays.

The curriculum consists of 22 courses offered in lockstep fashion. Students receive their entire schedule at the beginning of the program. Classes are never canceled; breaks are built in, and students know what they will be taking for the entire program. It is possible for the individual student to transfer in as many as 90 credits and there are "alternate required courses" automatically available for those courses which are commonly transferred into the program. Thus, for example, when Principles of Management is offered to the cluster, those having had that course at another institution, automatically are scheduled for Organization Theory during the same term. In the event that a student has transferred in a course for which there is no alternate required course and that student still needs the credit, a directed independent study is arranged with a full-time, main campus faculty member.

Currently, there are approximately 1300 students in the BPM program and these students take classes in about 65 different clusters. Many of the BPM clusters are considered "corporate clusters" in that they take place in corporate training centers. Corporate clusters currently include such companies as American Express, Tropicana, and Disney World. NSU acts in partnership with these companies by offering a discounted off-campus tuition rate, by evaluating corporate training for possible NSU elective credit, and in other ways working with the company over a long period of time. In return, the company provides us free classroom space and helps us recruit employees as potential students.

Each cluster in the BPM program is managed by a local Cluster Coordinator who acts as NSU's local representative, attends every class, registers the students, and in other ways acts as an intermediary between NSU and the local cluster. Each cluster also has a team from main campus which consists of a Faculty Coordinator, a University Representative, and an Academic Advisor. The Faculty Coordinator staffs all the classes in a given geographic area with a mixture of full-time and adjunct faculty. The University Representative is the recruiter who starts the cluster and performs retention duties during the life of the cluster and the Academic Advisor evaluates the students' transcripts, registers them for classes, and guides them through the program.

The single most important competitive advantage of the BPM program is that the off-campus program is identical to the BPM program offered on-campus. Students are assured a curriculum which is run by full-time faculty. All courses are standardized as are books and exit competencies. Unlike many off-campus programs which are run out of a continuing education program, the BPM has the same academic rigor and standards as the on-campus programs. Notably, all faculty, when hired, are committed to teaching both on and off campus. Thus, the BPM program is marketed on the high end of academic rigor vis-a-vis the competition. It is not the fastest program, it is not the cheapest program, but our graduates can boast an undergraduate, academic experience of which they can be proud. Two other outstanding characteristics of this program are the Farquhar Center's Writing Across the Curriculum policy and the department's Ethics Across the Curriculum policy. Each assures the students competitive advantage in their academic experience.

BPM Goes Online!

The decision to take the BPM Program online was definitely driven by marketing considerations. Long a frontrunner in undergraduate, off-campus education, it was felt that there were pockets of students whose needs were still not being met. For example, many workers are tied down to second or third shift work schedules that make evening classes impossible. Others are not currently in the workplace but want to prepare to return in the near future. Still others do not reside in an area populated enough to warrant an off-campus location. Likewise, traditional off-campus classes may not be appropriate for the growing number of business people who travel a great deal of the time.

Increasingly, professionals who work out of a virtual office are expecting a virtual classroom to complement their lifestyles. (Gibson and Herrera, 1999, p. 57)

Regardless of the compelling reasons to launch the BPM Online, it was still not an easy decision. The undergraduate business faculty had absolutely no experience teaching in the online environment, there were no budget lines available to add more faculty and staff to begin this program, and the existing faculty and staff seemed fully committed in delivering the six majors already run by the department.

Nevertheless, one of the authors, herself the Director of the Business and Administrative Studies Department decided to take as her pet project the launching of the BPM Online program. It seemed clearly the thing to do to maintain competitive advantage in the future. The timing also seemed appropriate because while many institutions were beginning to offer courses online, very few complete programs were online at that time.

Early discussions with business faculty and the broader administration showed support for the idea. Faculty were interested in learning about this new medium and becoming involved in online teaching; administration was very interested in adding an undergraduate component to NSU's online offerings, as long as it did not demand much by way of financial resources. It was decided, therefore, in the spring of 1997 to launch a pilot program as the first step of taking BPM online.

Step One: The Pilot Program

In the Spring of 1997, six full-time faculty members including the Director were identified to take part in the pilot project. Each agreed to develop a course over the summer and to teach that course to a group of existing students in the fall. Online courses were to be matched with on-ground courses taught by the same teachers so that pre-tests, post-tests, common exams, etc. could be used to compare online and traditional results. While the pilot group instructors had no previous experience teaching online courses, the first big step was aided by mentors from the graduate School for Computer and Information Sciences who had years of experience teaching Web-based courses. It was quickly decided to follow their format and overall structure, thus BPM Online became a predominantly asynchronous, Web-based instructional system which was run from instructors' home pages. Course interaction was structured to take place via email and bulletin boards with the occasional real-time chat room used by some, but not all, instructors.

The first challenge for the faculty, as may be expected, was to learn enough technology to be able to develop their courses. These instructors were all experts in their field with many years of teaching experience. Yet they found that considerable rethinking of pedagogy was necessary to translate their classroom-based course into its online equivalent. The Director, for example, undertook the conversion of a senior level organizational behavior class which she had been teaching in some form or another for almost 20 years. She logged in 100 hours of development time before declaring her course ready to pilot. Some of that time was spent learning basic html procedures so that she could develop her Web site. Most of it, however, was spent developing about 100 pages of lecture notes to put on that Web site. These notes would be the equivalent of what she normally covered face-to-face in class with her students. The differences, however, were notable. First, with the Web site, it was possible to embed enrichment links on many topics right into the lecture notes. Secondly, it was also possible to assign and monitor a week-long discussion on the bulletin board designed to spark group discussion and critique.

While every instructor came up with a slightly different formula, common elements of the courses soon emerged and were agreed upon.

- Every course would start on Thursday and end on Wednesday of the following week.
- To assure that students didn't get lost, each instructor would send individual weekly feedback and grades to students by the weekend following the close of each week.
- Each instructor would use an email alias to communicate with the class and a course bulletin board to support assignments, discussion, etc.
- Each Web site, although different in design, would have common elements including the course outline and grading criteria, weekly notes of some type, detailed learning objectives and measurements of outcomes, and a course bulletin board. A common chat room was identified for

those who chose to include this synchronous component.

In retrospect, the best thing that occurred in setting up this pilot project was the inclusion of full time faculty. From the beginning, the full time faculty "owned" this program and through that ownership assured the quality and reputation of the online BPM equivalent. Course exit competencies were 100% identical to onground offerings and for all intents and purposes, the BPM Program being developed online was equivalent to the traditional program which had already enjoyed 20 years of success.

By the fall of 1997, the pilot courses were ready to go and all six instructors taught their online courses and the onground equivalents.

Step Two: Analyzing the Results of the Pilot Program

After everyone taught their paired courses in the fall of 1997, comparisons were made between pre-tests, post-tests and overall course grades. In every case, the online students did as well as their onground counterparts; in some cases they did better. Each instructor reported a positive first experience and indicated willingness to continue teaching online courses. The latter fact was particularly important as this group of pilot faculty served as recruiters for other full time faculty in the next stage of developing the program.

In addition to the positive academic results achieved in the first classes, three other elements are believed to be responsible for the continued level of enthusiasm by the pilot faculty. First, faculty were paid to develop the courses. In essence, faculty were being paid to learn new skills that would in turn make them more valuable in the market place. Secondly, legal opinions from the university attorneys established that the courses developed belonged to the faculty member. This was an important issue and prevented faculty from worrying whether the university would pay them to develop the course once and then take the course and use it as they pleased. Thirdly, faculty members who developed courses were assured that each would be the lead faculty member for that course and have the right of first refusal every time the course came up in the online environment. In sum, the university went out of its way to adopt a very liberal policy towards faculty developing these online courses and this, in turn, encouraged faculty to get involved.

During this period of time, late fall of 1997, it also became apparent that the developing program needed more technical and administrative assistance if the BPM Online program were to really launch by our target date of August of 1998.

Step Three: The Second Developmental Team

In January of 1998, a second faculty team was put together to develop nine more BPM courses. As it was impossible to identify a full time faculty member who wanted to take responsibility to teach the first language course in the program, the first adjunct faculty member was recruited to the project. This created a number of additional logistical problems as this person, while long associated with the BPM program, lived at considerable distance from main campus.

The second faculty team was given the same level of training and technical support as the first team. They also were provided the same overload stipend for course development. In the opinion of the authors and as stated before, this stipend was critical in attracting the critical numbers of full-time faculty to the project.

While Team 2 was working on developing their Web sites, most Team 1 members taught another section of their original online courses and shared their findings with the developing team. This was a decided advantage for Team 2; they had all the work of the pilot study faculty to use as models. As spring turned into summer and the second group of developed courses were ready to be offered on a pilot basis, the program still had no administrative or marketing substance. It was time to step up the pace.

Step Four: Administrative and Marketing Considerations

By April of 1998, with the academic program well under development, it was now undeniable that an administrative and marketing plan had to be prepared. Again, the reality was no additional resources were available to run this program; it would have to be an appendage of the normal BPM operations. To provide the reader context for this statement, it should be remembered that BPM is run as one of six majors in the Business & Administrative Studies Department. The department is organized with Assistant Directors in Operations, Academic Programs, and Marketing. Unlike the more traditional academic department, this department is responsible for operations and marketing as well as delivering academic programs. It operates very much like a small college in another institution and services nearly 2000 students. This detail is provided so that the reader will understand that it was not a matter of going to the Admissions Office and asking for a recruiting plan or going to the central administration and outlining our needs. Anything to be done to launch BPM Online had to come from within the department and with existing resources, with one very notable exception.

To this point, there had been two people central to our technical efforts. One was an accounting instructor who had a great deal of Web skill and who had herself experienced online instruction as a student. The other was a secretarial person who was completing her masters degree and was also herself an online student. These two people worked with both Teams 1 and 2. In the case of the faculty member, she was given course release to compensate her and for the secretarial person, a small monthly stipend was added to her salary. For this, each person put in many long evenings and weekends getting this project going–a true labor of love. By May, 1998, we had targeted the secretarial person for a promotion to Online Coordinator beginning July 1. A such, she was slated to coordinate all administrative details of the first online cluster including registration and advising students. She would also continue providing technical support to the faculty. At the same time, the soon-to-be Online Coordinator began intensive development of the

BPM Online Web site which gave details of the program. The site can be found at www.polaris.nova.edu/Business/online.

At the same time, the department's management team, the Director plus Assistant Directors of Marketing, Operations, and Marketing began to consider the marketing plan. In fact, very little was known about marketing online programs. Again, conference with colleagues at the graduate School of Computer and Information Sciences provided information on the types of advertising they did. A BPM Online brochure was created as a companion piece to the regular BPM prospectus.

BPM Online Goes Live

Slowly, the word about BPM Online spread, prospective students began finding the Web site, and a steady stream of telephone calls came into the marketing office. It took an additional two months of recruiting, however, before the first cluster was successfully launched in October of 1998. Since then, two additional clusters began in January of 1999, one began in March of 99 and a fifth began in May.

As currently conceptualized, BPM Online students take two courses every eight weeks for 5 terms a year. There are no courses in the July and August term as it is felt that both faculty and students need a break. The entire 22 courses can thus be offered in 11 terms, typically over a period of 27 months.

During the winter and spring of 1999, a third developmental team completed the balance of the curriculum. These faculty will also have a chance to test out their courses with small groups of students before teaching BPM Online students. Throughout the process of developing and implementing BPM Online, many lessons have been learned. These lessons, both pedagogical and administrative, are presented for the benefit of those who may be considering the decision to take a course or a program online.

Pedagogical Lessons

The authors and others have learned a good deal from teaching online which can shorten the learning curve of other professors. Here are some of those findings.

- "Don't underestimate the amount of time it will take to teach online. Each faculty member found that they put in at least the same amount of hours per week; most found out that they put in more although those hours could be distributed at the faculty member's convenience. (Gibson & Herrera, 1998)
- Faculty have to completely reconceptualize their courses and concentrate not on what they will be doing in class but on what and how the student will be learning. Whereas the traditional classroom format may cause the instructor to ask, "What am I going to be doing tonight," the online classroom changes that question to: "How is the student going to be learning this material? What options am I building in for different learning styles? How am I accounting for the fact that I cannot see puzzlement on the student's face? What feedback tools will I use." (Gibson & Blackwell, 1999). The online faculty role is one of a facilitator more than as an instructor.
- The creation of online community is something which must be planned and deliberate. This process begins with instructors sending personal biosketches to the class before it begins and requiring students to do the same as a first assignment. Individual and group participation is built into the weekly class activities. Course bulletin boards provide each class an asynchronous forum for homework, critiques and group meetings.
- Faculty should learn the technology and how to control it. The authors do not recommend that faculty passively hand over their courseware to a technical person, but suggest that they learn elementary Web techniques so that they can tweak and change their own courses at a moment's notice.
- Individual participation must be carefully monitored. It is as easy for an online student to get lost as it is for a lecture hall student to fall asleep in the back of the room. Require numerous, short, weekly assignments to keep students participating. Be sure that at least part of this work requires regular interaction between students. Provide weekly feedback including a 24-hour response goal for email messages and weekly grade reports to each individual.(Gibson, Tesone, & Blackwell, 1999)
- Be sure that students move through the material at a pre-determined rate. Do not confuse online instruction with self-paced instruction. Create the work in weekly modules. Within the week, students may choose when and where to work, but the assignments need to be concluded by the end of the week.
- Decide on the right amount of formality and informality. "The authors recommend that a good deal of informality be built into the Web-based course. Students need to feel as if the instructor has a personality and is approachable and is not just some faceless entity who leaves them written messages in a variety of places. The authors, for example, encourage students to call them by their first names. They also relate personal stories and anecdotes which are designed to provide students with a sense of their personalities and in turn encourage students to be more forthcoming." (Gibson & Blackwell, 1999)
- Plan a strategy for testing, perhaps the greatest single challenge for online instructors. Test security and test format are two key issues. Early recommendations include using a variety of testing formats and writing tests that rely heavily on analysis and application instead of objective repetition of facts.
- Consider carefully the relative merits of synchronous versus asynchronous communication. Proponents of asynchronous communication point to the fact that it eliminates the time and space boundaries that online programming is designed to defeat. On the other hand, proponents of synchronous communication believe that used carefully, the real time component adds a sense of normal communication to the course experience. The authors recommend that the beginning online instructor avoid synchronous chat rooms as they add a layer of technical and logistical problems for both faculty and students.
- One online instructor of our acquaintance swears by the use of humor in the online environment.

> "Using humor is also something that can be more or less comfortable for a given instructor. The authors try to take a light approach to conversation online; we do not want our students to measure their words carefully because this impedes communication. While we present our content in very serious terms, we look for the opportunity to quip with students and make ample use of the computer icons denoting laughing or smiling. :)" (Gibson, Blackwell, & Hodgetts, 1998, 282)

Administrative Lessons

- If at all possible, hire or appoint a project coordinator to lead the development efforts of any online courses or programs. The only exception to this recommendation might be if an individual faculty member or two want to develop an online format for an existing course and deliver it to existing students.
- Allow sufficient development time to get faculty trained and committed to the effort. Build in a pilot project so that courses may be first offered in a protected environment for students and faculty as well.
- Ensure that technical support exists as needed. This means that there is sufficient hardware and software for faculty and that a technical person is available who has had experience in Web instructional design. Be sure also that training programs exist for your faculty or can be custom designed for them.
- Choose curriculum which is already successful so that you don't have to be doing curriculum development and pedagogical adjustment at the same time.
- Identify champions for the online project at a very early point. Hopefully there will be a faculty champion and an administrative champion as well. Together they can encourage others to get involved and clear away administrative roadblocks.
- Recruit the help of a small group of enthusiastic, full-time faculty who are anxious to begin to teach online. Involve them in designing the online "requirements" such as the common elements to be required in each course. Be warned that if you choose to use adjuncts in order to get the program started quickly, the full-time faculty may ever be skeptical of the quality of the program and remain reluctant to get involved.
- Encourage the development group to operate as a team, having frequent meetings to share ideas and help keep each other motivated. The learning curve is not an easy one, so look for ways to build camaraderie and recognize accomplishments.
- Find the money to pay faculty developers and check out the legal question of who owns the resulting courseware. The authors fervently recommend that you adopt a very liberal posture on this, allowing faculty to retain rights on their courses. This will go a long way to encourage faculty to take ownership on your online offerings.
- Look ahead to courses or programs being offered online and figure in technical support not only for faculty but for the students as well. A well staffed help desk is extremely beneficial in preventing beginning students from getting frustrated.
- Also, plan ahead for online library facilities. If your institution does not already support a sizeable online library, find a way of outsourcing this requirement. Online students often reside in non-urban areas and they need to have access to substantial library resources. NSU's online library, for example, provides students with immediate access to numerous online and full-text data bases as well as links to inter-library loan and reference assistance.

Conclusion

The development and implementation of an Internet-based program is a major project. Yet, with the changing face of university education, it seems undeniable that most institutions will decide to take this step, to some degree, in the next few years or risk foregoing a large segment of the tertiary market. While some faculty will undoubtedly greet this challenge with excitement and enthusiasm, traditionalists will continue to bemoan the "fact" that nothing beats face-to-face instruction. Most faculty would agree, but when face-to-face interaction is not possible, the Web provides an alternate environment which is rich in promise given well-meaning professionals committed to getting through the transition.

Early reports from the Internet front, including personal experience of the authors, even indicates some decided advantages to Web-based education. These advantages include getting to know your students far better than in a traditional classroom setting where you only interact with them once or twice a week and the more shy students can shrink into the background; enriching the learning experience with the multitude of material already available on the Web (Why read a textbook account of Lincoln Electric's compensation system when you can go the Lincoln Electric Web page and see firsthand what they are doing?); and expanding the convenience of time and location factors for both students and professors.

Online education, in the opinion of the authors, is here to stay. It is an exciting new frontier for faculty willing to reexamine how they conduct their courses and learn some new skills. For those who intend to be active in academia for more than the next couple of years, it seems, at worst, a way to bolster job security and, at best, the opportunity of a lifetime to learn something new and exciting in our quest to educate students.

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Designing for the Web in a Seamless, Multi-Modal University

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Abstract

A major goal of Embry Riddle Aeronautical University is to provide opportunities for students to learn at any time and any place. To accomplish this goal, ERAU is creating learning systems that allow students to transfer between delivery methods to accommodate their specific needs.

Designing for the Web in a Seamless, Multi-Modal University

What is a "Seamless, Multi-Modal University"? Why create one?

Since Embry-Riddle Aeronautical University was founded in 1926, it has become the world's largest university specializing in aviation and aerospace. It has the largest undergraduate program in the world in Engineering Physics, Aerospace Engineering, and Aeronautical Science (for professional pilots). Time magazine has previously referred to ERAU as the "Harvard of the Sky." Many ERAU students are adults, who are employed full time, have families, have careers, and experience a very full life. To obtain their education, they need the opportunity to learn at any time and any place. Many attend classes at resident centers located all around the world. Many are in the military and are often reassigned to new locations with very short notice. To serve the needs of these students ERAU, has created courses integrating alternative, multi-modal delivery systems, allowing students the opportunity to geographically relocate and "seamlessly" continue learning in the same course at another campus, at another resident center, or continue it through the Center for Distance Learning. This "Seamless, Multi-Modal University," allows students to transfer from one mode of learning to another mode of learning without dropping out of the course and starting over at another place and time.

Currently, Embry-Riddle Aeronautical University includes:

- a Daytona Beach, Florida, campus with approximately 4,500 students
- a Prescott, Arizona, campus with approximately 1,800 students
- an Extended Campus with approximately 120 learning centers location around the world with over 40,000 class enrollments last year
- a Center for Distance Learning Program with approximately 5,000 self-study students enrolled last year located around the world.

Students at the two ERAU campuses are very similar to students found on most other college campuses, although most do have a very high level of interest in aviation and aerospace. Extended Campus students are older (most between 30 and 40 years old) and many bring considerable aviation and aerospace related experience to the learning process. Students are currently taking courses, for example, on board aircraft carriers, in tents in Bosnia, and in Kosovo. Many commercial airline pilots often have ERAU course materials in their luggage so they can study in between flights.

This distribution of students in locations throughout the world leads to many unique course development challenges and unique teaching/learning strategies and systems that allow students to transfer between delivery methods and modes in a "seamless" way to accommodate their specific needs.

As part of this seamless, multi-modal university, the Center for Distance Learning program, which began two decades ago, was one of the first and is now a very comprehensive self-study program. At this time, ERAU offers four complete academic programs through distance learning, including an AS/BS in Professional Aeronautics, a BS in Management of Technical Operations Degree, and an AS in Aviation Business Administration. The Master of Aeronautical Science degree, for example, has been offered for the last five years integrating various delivery methods and modes (e.g., video presentations, textbooks, study guides, software, etc.) with the use of the Internet (through CompuServe) for interaction between students and faculty and between students and other students. This degree was migrated to an ERAU

server in May, 1999, and all courses in the undergraduate programs are expected to also have Internet components in the near future. A goal has been to provide a single Internet site address (URL) for all students enrolled in courses on campuses, at resident centers, or through distance learning to access Web courses and information.

What factors, challenges, and constraints have impacted the design of courses on the Web for the "Seamless, Multi-Modal University"?

In addition to meeting the needs of very diverse students, the distribution of those students in locations throughout the world also creates several constraints for developing courses and effectively using Web technology(ies).

- Although the number is growing rapidly smaller, some students do not have computers.
- Many computers, owned by students, are at a very low level of sophistication.
- Many students live in locations that have Internet service providers that are not dependable, and many have slow transfer speeds.
- The slowness of many modems also prevents the use of the such Web delivery methods as streaming audio or video, complex animations, complex simulations, detailed graphics, detailed photographs, etc.
- Some students are required to pay long distance telephone charges for Internet connection.

Another major factor impacting the development of courses is the enrollment schedule for Undergraduate distance learning courses. Graduate distance learning courses basically follow a ten-week schedule, with classes starting five (5) times per year. That means that there is a class roster indicating which students are taking which section of a course. However, in the undergraduate program, enrollment is continuous and students may begin any course in any week. Working at their own individual pace they must complete the course within a fifteen-week time period. This flexibility in scheduling courses has been a tremendous benefit for working student. However, that means that no two students may be working on the same activity - in the same course - at the same time. In essence, this precludes designing learning activities on the Web that integrate group, team, or other types of collaboration, and very much limits design to activities which can be completed independently through self-study.

How has ERAU responded to the need for creating a "Seamless, Multi-Modal University" that can serve the needs of the students?

Given the limitations of students located throughout the world with varying computer and Internet service provider capabilities, slowness of modems, telephone charges, insufficient bandwidth, etc., the university has strategically chosen to provide students with alternative learning systems and modes of learning to meet student needs.

To most effectively address these educational challenges and constraints, there was a need to continue enhancing a course development process that facilitates the creation of multi-modal delivery systems.

It was initially determined that the development process must also allow for continued development of distance learning courses utilizing more traditional instructional methods such as textbooks, videotapes, Distance Learning Study Guides, etc. It was also thought that these methods could be complemented with Web activities that would support and enhance those courses.

However, as the development process evolved, it became apparent that our thinking needed to be modified. The process seemed to be even more effective and efficient when our primary goal was to create Web courses - that capitalize on the educational benefits and full potential of the technology - and, at the same time, utilize those same components (e.g., content files, videos, etc.) for creating courses with the more traditional instructional methods. The value of the time saved in the more efficient development process appears to justify some additional costs to modifying some course materials for multiple use. It was further determined that integrating those methods and media (e.g., printed materials, video segments, study guides, etc.) into a CD-ROM would be a more cost-effective strategy over time than continuing to duplicate and distribute them. The Distance Learning Guide is still available as a

printed document, but the same information will also be available on the Web as individual pages at the time it is needed, and it will also be available as Portable Document Format (PDF) files for printing from the CD-ROM.

The current plan calls for each distance learning student to receive a CD-ROM that provides a source for all course materials from which all forms of evaluation are created, except for textbooks and video-tapes used in some courses.

Courses are designed to utilize an Internet browser that allows the student to alternate between the CD-ROM and the Internet at the appropriate times, simply by selecting key words or phrases within course content. This approach capitalizes on the value of that technology and provides students with excellent quality videos, sound, and graphics, while the Internet access allows other interactive and collaborative learning activities that support and enhance the learning process.

If a student enrolled in a course does have satisfactory Web interconnectivity, they have a choice to use the CD-ROM, or to request personal passwords for accessing the Web where they will be able to obtain the same course materials. Students who do not have adequate computer capability, or Internet capability, can special order the course materials (e.g., printed materials, and/or videos) from the Center for Distance Learning.

To facilitate the "Seamless, Multi-Modal University" concept, what educational principles were considered important for creating student-centered learning systems in the course development process?

As we evolved the course development process, the continuously growing database of information related to the process for developing courses for distance learning was researched to see what could be LEARNED.

At the risk of sounding like an extreme oversimplification, an analysis process was used that was jokingly referred to as the "what we L.E.A.R.N.E.D." Analysis Process. Seriously, L.E.A.R.N.E.D. was an acronym that proved to be quite valuable in developing, and enhancing, the course development process.

The L.E.A.R.N.E.D. process helped us to analyze the principles of

Learning considered to be important in developing quality distance learning courses that helps learners learn.

It helped us to describe the learning

Environment where, and under what conditions, learning takes place.

It helped us identify the learning

Attributes of students and how learning needs to be flexible and adaptive for individual learning styles, and of technologies that make them most effective modes for learning in the student's learning environment.

It helped us look at the learning

Resources available to help students learn - from textbook to Web sites - that are realistic and cost effective.

It helped us assess the learning

Needs and the knowledge, skills, and abilities that will make students more successful in their future.

- It helped us listen to the learning.

Expectations students have, and what they want and desire from the learning experience.

It helped us focus on finding ways to address the learning

Discipline–absolutely necessary for success in a self-study learning environment, and how we can increase student motivation and self-discipline to learn effectively in a self—study environment.

The L.E.A.R.N.E.D. process reminded us that everything in the development, delivery, and improvement of distance learning courses should be done with the student - the learner - in mind. Every decision should be made with the perspective of "why are we doing this," and "how is it going to help the learner in some way."

Since the emphasis of this paper is on "designing courses for the Web in a Seamless, Multi-Modal University", The focus will be on how the principles of learning have impacted the development process for creating student-centered learning systems in this unusual learning environment.

However, first let us look at this unusual learning Environment.

A major challenge in creating a seamless, multi-modal university is to develop distance learning courses that provide a total self-study, independent, learning experience considered comparable to one a student would experience if the course were taken in a classroom on a campus or in a learning center located in Florida, Germany, or any other location in the world. Although the university strongly believes in the spirit of giving faculty what is considered "academic freedom" to teach their course in the class room learning environment on campus and in learning centers, the need to develop courses utilizing alternative, multi-modal delivery systems is very important for those students who geographically relocate and want to continue their education in the same program with ERAU. It is important to assure that there is consistency in course learning outcomes, and that the basic course content outline is the same for all students irregardless of where, or how, the course is taken.

Next, let us look at Discipline.

In a self-study learning environment, students must become more proactive and accountable for their own learning. A challenge in the course development process is to find ways to help students be successful in a self—study environment by increasing student motivation and encouraging self-discipline. Many students have experienced throughout their previous education a learning environment quite different from the one they experience through distance learning.

Needs of students are also important.

Obviously, the primary need for any student is a course that provides the knowledge, skills, and abilities that will help them be successful in the future. Students need a course that is focused and purposeful. They need courses with short learning activities that will fit into the life styles and busy work schedules of students with very limited time for learning. They need a flexible learning environment that allows them to study during times when they are most productive. For many students currently working in or hoping to work in aviation and aerospace, they need courses that are relevant to that industry.

In addition to what students need, they also come to a university program with Expectations.

There has been much educational debate about how students today are different than they used to be. Yes, many are exposed to a much more active life style that bombards them with stimuli from every direction, and many of them are asking for a learning environment that also excites them about learning and stimulates them to become involved in the learning process. Many are demanding a quality learning experience, and one that provides them real value for the money they are investing in their education and future. Students are asking to be able to learn at any time and any place, to transfer between delivery methods and modes of learning, and they want access to course materials and a Faculty/Mentor seven

days per week - 24 hours per day. Students come to the university for many different reasons, and with many different expectations, so it has become increasingly important to provide each student with a learning environment that gives them more choice in how they learn and when they learn. Designing a course for the Web brings additional challenges to meet those student expectations.

Also, very important to consider in the development of distance learning courses are learning Attributes.

That includes the learning attributes of both students and the technologies chosen for use in various learning environments. In the self-study, distance learning environment, it is increasingly important to consider in the course development process how individuals learn, and how learning experiences can be created that are flexible and adaptive for individual learning styles.

It is equally important to consider in the design of courses that each technology has certain attributes, characteristics, or traits that increase their capability to help students learn. It is very important to remember that technology is only a tool to help us deliver good quality education. Technology needs to be integrated into the learning process so that the full educational potential of that technology can be realized to facilitate learning. The technology attributes should support and enhance the ability of a student to learn both faster and better. In the development process for creating courses in a seamless, multi-modal university, selecting the most appropriate technology becomes very important.

Also, important in the course development process is the selection of value-added Resources.

Although ERAU has full production capabilities for developing audio, video, CD-ROM, etc., which are designed for specific learning objectives, the course development process encourages the review of all forms of resources that will help students learn. With excellent multi-media resources being created by other universities and commercial organizations, the development process should focus on selecting the best resource for effective and efficient learning.

With increasing use of CD-ROMs to provide printed materials and other visual media, video segments, etc., the development process must assure that copyright issues are appropriately addressed. With the tremendous potential of the Web to search libraries from around the world and to obtain information from thousands of related Web sites, numerous questions have arisen related to validity of information and how the information is used by students and faculty. Creating learning activities that capitalize on the potential of these resources is another major challenge for the developers of Web courses. To address this challenge, as well as the other challenges of meeting the needs, expectations, selecting appropriate technologies for the learning environment, etc., a development process was created based on many principles of learning that are believed to be important in developing quality distance learning courses that helps learners learn.

Let us now explore some of those principles of Learning important to creating student-centered learning systems.

It is important for the course development process to:

1. Provide alternative multi-modal delivery and learning systems that allow students the opportunity to geographically relocate and continue learning at another campus, at another resident center, or continue the same course through the Center for Distance Learning. (Program Continuity)
2. Identify, or confirm, student educational needs so that the knowledge, skills, and abilities needed by students can be accurately reflected in the course Learning Outcomes and objectives, that content can be organized and sequenced for most effective student learning, and that new courses can be identified and developed to enhance and keep current the distance learning program. (Needs Assessment - Currency)
3. Assure that courses are assessed, and revised as needed, to meet university quality standards, to meet requirements of accreditation agencies, and provide students with a quality, accredited program. (Quality Enhancement)
4. Assure that courses are developed in consideration of adult learning principles and educational concepts that will better address the unique attributes and characteristics of the adult learner.

(Educational Soundness)

5. Use a systematic approach to effectively and efficiently manage the course design and development process that will assure consistent quality, a timely process, and courses for students that have value and worth. (Systematic and Cost effective)
6. Use tools and templates that will help Content Experts - to do what they can do best - provide content of value to the student. (Effectiveness and Efficiency)
7. Select and use technologies that will capitalize on the educational benefits and full potential of the technology's attributes - to do what it can do best - and provide students effective technology-based learning systems. (Effective Technology Selection)
8. Select and use media resources (e.g., video segments, CD-ROMs, etc.) on the basis of the educational value they add to learning activities . (Effective Multi-media Selection)
9. Select and use educational methods integrating technologies, multi-media, and traditional media (e.g., textbooks, videotapes, study guides, etc.) in creative and innovative ways to help students learn. (Innovation)
10. Create student-centered learning environments that provide opportunities for students to:

- access all course materials, and a Faculty/Mentor - any time - any place - seven days per week - 24 hours per day (Flexibility)
- become actively involved in the learning process through use of frequent, meaningful, and value-added learning activities. (Interactivity)
- learn in a wide variety of ways that will accommodate individual learning styles. (Life Style Accommodation)
- achieve a high level of interaction with the course Faculty/Mentor, the course materials, and other students when possible. (Supportive and Collaborative)
- assess previous knowledge and experience and self-select optional learning activities that provide needed prerequisite knowledge. (Adaptive)
- obtain a real-world and practical learning experience through learning activities that blend educational theories and concepts and creates interest by relating content to an aviation and aerospace perspective. (Relevancy)
- access course materials which communicate the importance and rationale for course content through content overviews, summaries, clear directions for learning activities, and transitions between learning activities (Motivation)
- measure their personal learning progress throughout a course with frequent, meaningful, continuous, secure, and private evaluation methods. (Continuous Assessment)

What are the major components of the Distance Learning course development process?

The major components of the course development and revision process are intended to provide a systematic and consistent process for assuring that the needs of the student are adequately and appropriately addressed in the design of courses. Course development projects frequently include several team members working together (e.g., Instructional Designers, graphic designers, video production experts, Web programmers, etc.), but this paper will focus only on the tasks performed by the Content Expert to illustrate the major components of the process and the systematic approach needed for creating high quality courses. Since many content experts developing distance learning courses live in locations other than in Daytona Beach, Florida, several course development tools and templates have been created to help them in the development process. Some of those tools are also described below.

Development Tasks and Deliverables for the Content Expert

1. Review and assess all existing course materials to determine if content is current, accurate, complete, appropriate for the adult learner, and meets university quality standards. Make recommendations for needed changes. The deliverable is the Assessment Form.

   The Assessment Form Tool is used for assessing all learning resources, and student evaluation materials for a course, to determine if course content is current, accurate, comprehensive, appropriate to the course objectives, appropriate for the adult student in a distance learning course, and consistent with aviation standards and regulations.

Exceptions and recommended changes are noted on a Continuous Improvement Plan, and actions are provided to address each. This plan provides input into course revisions. This Assessment Form also provides a proactive, yearly review of each course for accreditation documentation.

2. Review and re-write learning outcomes in the university outline as needed (keeping the original intent).

   The Learning Outcomes/Objectives Tool assists the Content Expert in writing the Learning Outcomes and their related objectives which enable the learner to accomplish the Learning Outcomes

3. Write specific "enabling" objectives to enable students to accomplish the learning outcomes. The deliverable is the Objectives Form. See Tool above.
4. Analyze how enabling objectives are related to each other. Determine how they can be organized into modules, and sequenced, for most effective learning. The deliverable is the Objectives Form. See Tool above.
5. Identify, evaluate, and recommend learning resources (e.g., Web sites, textbooks, chapters from one or multiple textbooks, commercial materials available with copyright availability, etc.) to support the objectives of the course/modules and cover course content. The deliverable is the Resource Assessment Form.

   The Resource Assessment Tool assists the Content Expert to identify and evaluate the learning resources needed to perform the Learning Outcomes, and to facilitate obtaining the needed copyright permissions needed for use in the course

6. Create a design matrix, which indicates which objectives are covered in which learning activities and how each objective is evaluated, that will assist the course Faculty/Mentor to respond to student questions. The deliverable is the Design Matrix.

   The Design Tool illustrates how a specific learning activity is related to specific Learning Outcomes, Objectives, and evaluation methods.

7. Develop a Distance Learning Guide (or equivalent Web pages), using templates and formats provided. This task includes:

- creating, or confirming, learning methods (activities) for addressing all course learning objectives.
- planning, or creating, graphic and other visual materials for integration into the Distance Learning Guide, Web pages, or other media-based course materials.

Deliverables are the completed templates for Course information and all other Modules.

The *Distance Learning Guide - Course Information Template for the Content Expert* includes questions to respond to, or guidelines, that will facilitate writing the various components of the Course Information Module of the Distance Learning Guide.

The *Distance Learning Guide - Module Components Template for the Content Expert* includes questions to respond to, or guidelines, that will facilitate writing the various components of the Course Modules of the Distance Learning Guide.

1. Plan, outline, and actively participate in the creation of video or audio segments that present or deliver content information. Deliverables are the content outline(s) for segments, and active participation in the production process.

   The *Content Outlines Tool* for media development is a guide for writing content outlines needed for producing video segments.

2. Create a Faculty/Mentor Evaluation Tool Kit, including examinations with answer keys (two versions required), and tools for other evaluation items (e.g., research paper criteria, case analysis sample solutions, individual or group projects solutions, etc.).

   The *Faculty/Mentor Evaluation Tool Kit* includes all evaluation criteria, responses, answers, solutions, etc. to help them respond to student questions. For example, a research paper will require a set of criteria for assessing the completeness, comprehensiveness, validity of the research, quality, etc. Essay questions from examinations will require model answers for comparison to students' answers.

What type of Learning Activities are integral to student success in distance learning?

Interactivity is the key to learning results! Getting students involved in the learning process! Helping them to focus on what is most important in the content! Helping them to see relationships between content areas, and why it is important! Helping them to organize their thoughts and expand their perspectives! The goal of any activity should be to help the student see value for what they are learning — other than memorizing the material to respond in some form of evaluation so they can "pass the test". A challenge of course developers is to provide students with opportunities to demonstrate the behaviors stated in the course Learning Outcomes and the Enabling objectives.

Five types of Learning Activities

Below are descriptions and some examples of five types of learning activities that are part of a tool for content experts to use in the course development process.

1. Foundational Knowledge Activities (If student variance requires)
2. Content Application Activities
3. Asynchronous Web-Based Enhancement Activities
4. Synchronous Web-Based Enhancement Activities (If student geographical distribution will allow)
5. Self-Check Activities

Foundational Knowledge Activities

The Foundational Knowledge Activities may be OPTIONAL for the student with previous knowledge or experience related to a course. By completing an online assessment of their "prerequisite" knowledge of content principles and concepts related to a course, the student may be required to take none or some of the Foundational Knowledge Activities. For the student with no or minimal previous knowledge or experience related to the course, these Learning Activities will provide the needed knowledge to be most successful in the module. All students will have to successfully complete the online assessment before proceeding to other module Learning Activities. The Foundational Knowledge Activities should help to minimize and accommodate differences between students with varying levels of previous related work experience, and also provide a foundation of knowledge for those students with no or minimal work experience.

Content Application Activities (Self Study)

Learning Activities include what previously have been typically called course assignments or evaluation items in the traditional classroom. Examples could be reading in the textbook, reading articles or original materials in the study guide, working with a software simulation, or watching a video. They are integrated throughout the course modules with details given within these activities at the time they are needed.

Learning activities encourage students to take more responsibility for their learning, reflect more deeply on the course material, and often work more diligently on problems at their own pace.

A Learning Activity should ask the student to be involved with the content in some way, such as: providing an opportunity to answer questions, to apply what is being learned to a specific situation, to

use the information in some way, or to assess the relevancy of the content to their current work or future work. Correct answers or responses for Learning Activities are not provided, but a reference should be provided indicating where the correct answer, or response, can be found in the course materials (i.e., textbook, videotapes, etc.).

Content Application Activities could include, for example:

- For the situation below, would you use approach A, or approach B, to resolve or minimize the problem…
- For the situation below, what questions would you ask to assess the next step necessary in the analysis process? Where would you go to get additional information you need?
- For the situation below, would the following recommendations be appropriate and valid? If not, how would you change them and why?
- Compare the two situations below, and determine which would benefit most from the approach described in (a specific content segment) in your textbook.
- As you read (a specific content segment) in your textbook, consider these questions.
- As you view the videotape for this activity, consider how you can apply the information presented to the aviation industry.
- As you read the following information below, compare the perspective presented to the one presented in (a specific content segment) in your textbook. Write a paragraph illustrating how the perspective impacts your current thinking.
- Read the following case situation, and determine alternative responses based on the content presented in (a specific content segment) in the textbook.

Web-Based Enhancement Activities

The Web is considered to be a relatively new technology for learning, but how people learn is not–so learning activities need to be designed for the Web, which:

- are similar to those with which students are already familiar
- effectively capitalize on the "learning skills" individuals have to successfully complete the activities
- enhance current learning skills
- develop new learning skills for most effectively utilizing the newer technologies.

Web-based learning activities can be described as either "synchronous" or "asynchronous."

Obviously, "synchronous" Web-based learning activities require that all students and the Faculty/Mentor be on-line participating and interacting together at the same time. The educational value, of course, is that it can facilitate and encourage collaborative communication (e.g., online discussions, team assignments, etc.) among all students and the Faculty/Mentor.

"Asynchronous" Web-based learning activities can facilitate interaction and discussion between students and their Faculty/Mentor, other students, and the course materials, however, it has to occur over time and through such other learning methods or technologies as Email, file transfers, fax, or telephone. One advantage is that interaction and communications among students and the Faculty/Mentor can occur any time during day or night, and in any time zone where a student might live.

Either type can integrate such learning strategies as uploading papers, presentations, projects, etc. for review by peers, sharing perspectives on issues or problems, contributing information to online forums and bulletin boards, taking self-tests,

Asynchronous Web-Based Enhancement Activities

Web-Based Enhancement Activities can provide focus and enhancement to the Content Application Activities, and would facilitate learning through the interaction between students and Mentors and with other students. The Web components could also be a primary means of helping keep courses current.

The Web could be used in a Learning Activity, for example, to:

- research current issues related to the content presented in your textbook in a specific content segment;
- go to a specific Web site to research current articles related to the issues discussed in your textbook in a specific content segment;
- go to a specific Web site to identify key information (e.g., major factors, benefits of becoming a member of a specific professional organization, etc.)
- go to a specific Web site to assess how specific governmental regulations would impact a specific situation;
- research the Web to assess how the training function is related to the H/R functions for five different corporations, and identify key statements, or indicators, that Training & development is important to each corporation.

Synchronous Web-Based Enhancement Activities

Synchronous Web-Based Enhancement Activities can only be used when all students in a class can agree on a time convenient to everyone. In some courses it is possible to have students from many, or all, of the 25 time zones around the world. Web learning activities might include, for example, chat rooms on a variety of topics, a mentor making a short presentation or demonstration, or facilitating a discussion using an electronic "whiteboard," or students making presentations with the electronic whiteboard to other members of the class.

Self-Check Activities

Courses also include "Self Checks" to provide the student with some feedback regarding their knowledge and understanding of the content, but they are not intended to be comprehensive. A self check can include, for example, questions, exercises, practice problems, simulations, case studies, problem analyses, etc., and will provide correct answers, or specific responses.

Summary

Developing Web courses for a seamless, multi-modal university presents many challenges to course developers. Our response has been to create a course development process based on learning principles that are considered most important in developing quality distance learning courses that help learners learn. That process provides a systematic, consistent approach for assuring that the needs and expectations of the student are adequately and appropriately addressed in the design of distance learning courses.

Author Information

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A Hybrid Approach to Web—Delivered Courses: Preparing Principals and Superintendents

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Abstract

The paper describes an action research study of the implementation of a hybrid approach to delivering graduate level courses in the preparation of K-12 public and private school principals and superintendents that incorporates both Web—based course content delivery and traditional classroom meetings. Based on the experiences of the author and his students in four Web—delivered courses during the 1998/99 academic year in the Department of Educational Leadership at Winona State University, the paper will analyze the struggles of both students and the instructor in trying to reach a balance between the traditional classroom approach and a Web—delivered approach.

Well known to both students and instructor is the traditional mode of graduate course delivery: a syllabus is created and distributed, resources are assembled consistent with the syllabus, and weekly meetings are held to execute the transfer of knowledge. Students who have made a decision to study for a degree at the graduate level and who have successfully negotiated admission into the educational leadership program are generally competent "game players" of the traditional classroom approach to teaching and learning. But a change in the rules of the "game" caused uncertainty in both the student and instructor. Student interviews and online evaluations of their distance learning experience showed a conflict between "social" learning as they have experienced in the traditional classroom approach compared with independent, self—directed learning as experienced in the Web—delivery approach. However, there was almost unanimous agreement that not having to attend a weekly evening class for a semester (some have to drive up to 100 miles) is a convenience that overshadows any weaknesses experienced in their Web—based learning. Instructor "journal" entries showed a struggle with coordinating meaningful and appropriate class meetings.

An analysis compares the ten dimensions of interactive learning on the World Wide Web (Reeves and Reeves, 1997) with the implementation of the hybrid approach to teaching and learning. Conclusions are drawn for the improved use of a hybrid approach incorporating both traditional class meetings and Web—based content delivery.

Reeves, T. C. and Reeves, P. M. (1997). Effective dimensions of interactive learning on the world wide Web. In B.H. Kahn (Ed.), Web-Based Instruction, (pp. 59-65). Englewood Cliffs, NJ: Educational Technology Publications.

A Hybrid Approach to Web—Delivered Courses: Preparing Principals and Superintendents

Introduction

It seemed like a logical next step in course delivery. Why not deliver some courses using the Internet? After all, the Department of Educational Leadership at Winona State University had been delivering its graduate degree programs via interactive television (ITV) for over ten years and had a reputation for using cutting edge technology to enhance access to coursework and degrees. Many students have chosen to earn their Master's and Specialist degrees from us because of it. And, by early 1997, every school in Minnesota and almost all schools in Wisconsin had been "wired" for access to the Internet.

For practicing PK-12 educators in our region, time and distance are often primary issues when deciding if and where to earn a graduate degree. Some students have to drive up to 150 miles one way to attend class. In winter, the distance issue becomes exaggerated. The amount of time available for students to meet family, work, and social obligations is lessened significantly because of the weekly commute.

Intrigued by the notion of delivering courses using the Web as a medium for asynchronous distance

learning, and to better meet the time and distance concerns of present and future students in our program, I proposed and received department approval to convert and deliver via the Web my assigned courses. However because of personal concerns and those of department colleagues about Web-based learning, I proposed that a hybrid approach be taken–one where during the defined term, students would concurrently engage in course content online and attend traditional ITV class meetings.

Framing The Study

The study described here was based on two guiding questions and their corresponding components for analysis.

Question 1: Based on the success of our ITV program, I believed that being able to access course content anywhere and at anytime had the potential to be a positive factor for students. However, how would student learning experiences with a hybrid approach to delivering courses compare with the traditional course delivery and meeting schedule?

Question 2: How would conversion of the courses to the Web compare with effective dimensions of interactive learning on the world wide Web?

The two research components were (1) analysis of student satisfaction data during the Fall and Spring Semesters of the 1999 academic year and (2) a subjective comparative analysis between the ten dimensions of interactive learning on the World Wide Web, as proposed by Reeves and Reeves (1997), and the results of student and instructor experiences.

The Department of Educational Leadership serves primarily rural educators in southeast Minnesota and midwest Wisconsin who wish to become PK-12 public, parochial, and private school principals and superintendents. Since Winona State University is located in the far southeastern side of the state, ITV had been used for over ten years to serve the education needs of Minnesota students located in and around Rochester, Minnesota about 50 miles to the west. Until now, ITV had been the extent of distance learning options for students.

The WSU semester schedule allows for fifteen traditional on-campus evening graduate level class meetings. Students in this study, however, attended traditional class meetings one-third of the time. The adjusted schedule provided for two weekly meetings at the beginning of the semester followed by monthly meetings thereafter.

Findings

Component One: Student Satisfaction Data

At the first class meeting, I asked students in each class to review the online evaluation and be prepared to reflect carefully at the end of the semester on their experiences with offering courses using a hybrid. The following statement was included in the Web site under instructor expectations and reviewed with each class:

"Share your thoughts about your experience in this course in a way that could improve the learning experiences of students to follow. Complete the course evaluation with the belief that what you say may help improve student preparation for school and district leadership. Telling me how upsetting your experience might have been will be less valuable than telling me what you think could be done to improve the course."

A total of 84 students in four educational leadership courses were involved in the study–two courses in the Fall Semester and two courses in the Spring Semester. The online course evaluation solicited student responses in two formats; (1) a numerical rating scale and (2) written comments on their ratings and overall experience with Web-based learning.

The numerical rating scale asked students to rate from 1 to 5 the extent to which four factors were

considered helpful in learning the content of the course via Web. Table 1 lists the number of responses in each rating category and the average score for each factor.

	Assignments	**Syllabus**	**Discussion Forum**	**Overall Course Information**
5 - Extremely helpful	8	23	14	20
4 - Very helpful	26	15	15	21
3 - Helpful	8	4	10	2
2 - Somewhat helpful	1	1	4	0
1 - Not helpful	0	0	0	0
Average	3.95	4.40	3.81	4.33

Table 1: N for Each Rating Category and Average Score for Each Factor

In the aggregate, Table 1 tells me that the students who responded seemed to believe each factor to be more than helpful. The desegregated responses show that six of the 43 students thought at least one category was below average–the discussion forum component receiving below average by four of the six.

Student perceptions do not provide an accurate means to measure the degree of actual learning. In this study, however, I was concerned with student perceptions of how much they thought they learned. Table 2 summarizes their responses.

Please compare the amount you learned in this online course with what you have typically learned in a traditional classroom.

	Category		
	More	Same	Less
N (%)	17 (40%)	23 (53%)	3 (7%)

Table 2: Amount Learned

Surprisingly, 40% of respondents indicated they learned more. The best I had hoped for was that they learned the same. Also surprising was that only 7% thought they learned less.

Students were asked to rate how much time they spent connected with the Web site online. Table 3 summarizes their responses.

How much time did you spend connected to the course online?

	Category		
	1-2 Hours per week	2-4 Hours per week	4-6 Hours per week
N (%)	9 (21%)	22 (51%)	12 (28%)

Table 3: Amount of Time Spent Online

Table 3 shows that 79% of the respondents spent more than two hours per week connected to the course online, of which 28% spent more than 4 hours. Even though student responses were likely approximations, they were still surprising. None of the 84 students had ever engage in online learning. As a result, I believed that less time would be spent connected to the course online.

While their comments about the assignments, syllabus, discussion forum, and overall course information will be helpful in refining the look, feel, and communication in current and future Web sites, I found their comments on what they liked most and liked least to be most enlightening and relevant to this study. Their seemingly honest and open statements will provide a strong foundation for the improvement of the teaching and learning experience.

Most comments in the Liked Least category referred to the need for more than five class sessions (see appendix for a list of Liked Least and Liked Most student comments). One student wrote, "I felt that there was an overload of information with very little time to discuss all of it. More class time to process with peers would have been great." Another wrote, "Not enough time to meet as a class. What about bi-monthly gatherings?" Other comments referred to the lack of peer contact, such as, "I am an auditory learner, so I find myself feeling a loss at not being able to share in the stimuli of discussions. I need the social community interaction to get my creative juices flowing" and "[I liked least] the lack of social interaction with other classmates." Finally, one student lamented that, "We didn't meet enough in person. I do not like the Web format very much. I wish I would have known before I enrolled."

A few comments in the Liked Most category (see appendix) supported the five meeting schedule, in contrast to the Liked Least category. One student wrote, "Thanks for an awesome learning experience. This was my first time doing an Internet course. I liked your balance of class time and Internet time. I strongly suggest you keep the five class periods. Do not ever go to just Internet. The people contact is still necessary, even though on the limited basis." Another wrote, "I disagree with those people that suggest we meet 'physically' more often. Why do we look at something new and progressive and try to find a way to drag it back into our 20th Century vision of education? Break the mold! In the 21st Century more distance learning will take place and more emphasis will be placed on students being responsible for their own learning. Instead of looking to meet more often, I suggest meeting less often and finding a way to improve the technology so we can do a real time conference over the net." However, most comments referred to the convenience of not having weekly class meetings; "Convenience was great!!!!! It is very difficult and tiring to drive two hours a night for class, especially if it were to meet weekly. I think there would be a way to have the structure that I need, but still have a Web class. I wouldn't give up on this at all!!!", "The opportunity to complete work at my own pace and when time allowed," and "I liked the flexibility of this course. This is an area that I want to go into, but I would be unable to do the course work had I been required to drive to Winona every week. It was also nice to be able to do it at my own pace. I have many things in the works and liked being able to work at this course when it suited my schedule."

Component Two: Dimensions of Interactive Learning

Assessing the effectiveness of teaching and learning easily defaults to a traditional model such as using exams or term/research papers to provide evidence to both student and instructor the degree to which the process has been successful. Although still valid for completing an evaluation feedback loop, the intent of this study was to assess student satisfaction with a hybrid approach to course delivery, not to determine if such an approach improved student learning. Therefore, a different model was needed to assess the effectiveness of shifting away from a traditional course delivery method. Reeves and Reeves

(1997) proposed a model to assess the effectiveness of Web-based instruction which includes ten dimensions of interactive learning "that can be enabled via the World Wide Web ... based upon research and theory in instructional technology, cognitive science, and adult education ... [and are] presented as a two-ended continua with contrasting values at either end." (p. 59) The dimensions are (1) pedagogical philosophy, (2) learning theory, (3) goal orientation, (4) task orientation, (5) source of motivation, (6) teacher role, (7) metacognitive support, (8) collaborative learning, (9) cultural sensitivity, and (10) structural flexibility. Analysis was done by making a subjective comparison between where I believed my Web courses should ideally rank on each continuum and where I judged the courses to actually rank based on the defining characteristics of each dimension. The following symbols were used:

Ideal Actual

1. Pedagogical Philosophy (Contrasting Values = Instructivist vs. Constructivist)

Instructivist - Objectives exist apart from the learner; learners viewed as passive recipients of instruction; objectivist epistemology that defines knowledge as separate from knowing; knowledge exists in external truth and can be precisely measured.

Constructivist - Cognitive structures are constructed from the learner's unique intentions, experience, and cognitive strategies; learning environments are rich and diverse; instruction is made relevant for the learner; learning can be estimated only through observation and dialogue.

Pedagogical Philosophy

Instructivist Constructivist

My belief about student learning in our graduate program is based on the constructivist notion that the individual brings to the course "pre-existing knowledge, aptitudes, motivations, and other characteristics that are difficult to assess, much less accommodate." (p. 60) However, in building each course for the Web, I predetermined the learning objectives apart from the learner, miscommunicating an ...structivist philosophy where measuring right answers could be an outcome of the course. Little attempt was made to individualize the learning needs of each student. Yet, I assessed student performance in the context of their individual level of professional development, blending knowledge acquisition with understanding.

2. Learning Theory (Contrasting Values = Behavioral vs. Cognitive)

Behavioral - Instruction shapes desirable behavior through the arrangement of stimuli, responses, feedback, and reinforcement; behavior is observable.

Cognitive - Internal mental states emphasized; variety of learning strategies are required depending upon the type of knowledge to be constructed by the learner.

Learning Theory

Behavioral Cognitive

While difficult to fully separate from the pedagogical philosophy dimension, there were behaviors I wanted to observe. I do believe that my style of instruction shapes how students demonstrate their learning. To assess desired student behaviors, I asked them to post online their reactions to articles, work individually and collaboratively on case studies, and, after reviewing related literature, write their personal position on issues related to the content. Independent online study was support and extended with traditional classroom small group and large group discussion. Therefore, I believe students experienced a greater variety of learning experiences using the hybrid approach as compared with a traditional classroom approach.

3. Goal Orientation (Contrasting Values = Sharply Focused vs. General)

Sharply Focused - Accepted basic content knowledge and skills.

General - Higher order knowledge.

Goal Orientation

Sharply Focused General

There is general consensus that a knowledge base exists for the study of leading and administering PK-12 schools. Therefore Web-based study of specific theories, definitions, and accepted practices provided students with an efficient means to build a base from which the complex problems of practice were analyzed. Periodic class meetings allowed students to practice their thinking in a safe and supporting environment.

4. Task Orientation (Contrasting Values = Academic vs. Authentic)

Academic - Completing traditional academic exercises.

Authentic - Situating practice and feedback within realistic scenarios.

Task Orientation

Academic Authentic

It has been my experience that this component has special meaning to school leaders and administrators. I continually experience pressure from my students to lessen the study of theory and intellectual analyses in favor of practical study and problem solving. Consistent with the Learning Theory dimension, Web-based study of concepts allowed the student to study independently the theories of practice followed by class meetings to apply those theories in realistic scenarios to solving practical problems.

5. Source of Motivation (Contrasting Values = Extrinsic vs. Intrinsic)

Extrinsic - Externally rewarded learning.

Intrinsic - Internally rewarded learning.

Source of Motivation

Extrinsic Intrinsic

My teaching and learning pedagogy has mostly supported intrinsic learning of course content, since individual meaning-making is a critical element in preparing school leaders. Demonstrations of their learning are not graded in a traditional manner, thereby reducing dependence on extrinsic grade rewards. The Council of Graduate Schools (1994) suggest that master's level instructors must be orientated towards the process of learning over the products of education. Course grades are not based on whether students provide right answers, but whether they thought deeply about an issue and competently write

their position. To enhance intrinsic learning, I endeavored to build a stimulating site included visual models, color, animation, and links to other sites. T o support individual meaning-making, "test your knowledge" content reviews were used containing links to explanations. Some students, however, indicated that without the pressure of regular class meetings, they had difficulty in another area of motivation–motivating themselves in a timely fashion to study the material online.

6. Teacher Role (Contrasting Values = Didactic vs. Facilitative)

Didactic - Telling students what they should know.

Facilitative - Coaching, mentoring, and guiding student learning.

Teacher Role

Didactic Facilitative

Prior to placing my courses on the Web, class time was devoted to "knowledge transmission" in a lecture/discussion format using computer software to enhance the presentation of material. Concurrently, questions were asked and a discussion was guided related to the topic. During the first Web-based course, and not having experience with Web-based learning, I mistakenly retained the lecture/discussion format. Part way through the course, however, students said that it was not necessary for me to present the material again and that they needed time to work in groups. I learned quickly that the Web-based content provided them with significant learning guidance. We agreed that at the beginning of each session, an open discussion will take place to clarify questions surrounding unit theories or concepts.

7. Metacognitive Support (Contrasting Values = Unsupported vs. Integrated)

Metacognitive Support

Unsupported Integrated

Reeves et. al reference Flavell's (1979) definition that "[m]etacognition refers to a learner's awareness of objectives, abilities to plan and evaluate learning strategies, and capacity to monitor progress and adjust learning behaviors to accommodate needs," followed by their own streamlined definition that "... metacognitive skills are the skills one has in learning to learn." (p. 62) They also write that "[m]uch research and development remains before WBI regularly includes sophisticated metacognitive support, but the potential is enormous." (p. 63) Little in the way of metacognitive support existed in my Web sites. Graduate students typically know how to learn, or at least know how to show they have learned, to survive in a traditional education setting. Students in my classes may have attempted to duplicate how they learn in a traditional classroom setting, which may be why some have experienced frustration with a hybrid process. More research is needed to assess just how students are learning in a Web-delivered environment.

8. Collaborative Learning Strategies (Contrasting Values = Unsupported vs. Integral)

Unsupported - Web site does not integrate collaborative learning; learners do not work in pairs or small groups to accomplish shared goals.

Integral - Web sites integrates collaborative learning; learners work in pairs or small groups to accomplish shared goals.

Collaborative Strategies

Unsupported Integrated

Because students were scheduled to attend five class meetings during each semester, collaborative projects were assigned to learning pairs or groups but not integrated into the Web sites. Implementing a hybrid approach where Web-based learning is supported with periodic class meetings, I see less of a need to integrate collaborative strategies into the Web site. However, I strongly support integrating collaborative strategies into a Web-course if no class meetings are scheduled.

9. Cultural Sensitivity (Contrasting Values = Insensitive vs. Respectful)

Insensitive - Does not accommodate the ethnic and cultural backgrounds among the learners using the Web site.

Respectful - Accommodates the ethnic and cultural backgrounds among the learners using the Web site.

Cultural Sensitivity

Insensitive Respectful

Since students in the educational leadership program come from small to medium size rural communities, there is little cultural or ethnic diversity. Not much thought, therefore, was given to whether the Web sites were ethnically or culturally sensitive. Much thought, however, was given to how to represent content in a visually interesting way consistent with my understanding of rural educator learning needs–a cultural implication of its own.

10. Structural Flexibility (Contrasting Values = Fixed vs. Open)

Fixed - Refers to only traditional academic settings.

Open - Learning systems used by the learner independent of time and/or place constraints that include asynchronous and synchronous communication.

Structural Flexibility

Fixed Open

Since students were required to attend only five class meetings, there was much greater flexibility for students to engage in their learning as compared with a traditional class only meeting schedule. However as student online evaluation comments suggested, it was also important for them to meet face-to-face. At this point in time, it is not clear to me that pure Web-based instruction can provide the same learning experiences as would a hybrid approach.

Conclusions

It appears that no fatal errors were made in the conversion to the Web. Students who participated in the online evaluation indicated that they were generally satisfied with their learning experience. However, one of my greatest concerns with moving away from traditional time- and space-constrained instruction, and that of the students who participated in the online evaluation, was losing the dynamic of classroom discussion. Over the years, students have indicated that one of the most rewarding aspects of class attendance has been sharing their thinking and hearing their peer's perspectives on issues, including stimulating before- and after-class discussion during carpool commutes. There is general consensus in

the literature that effective Web-based instruction includes an online interactive communication component. For example, David Leonard (1996) wrote the following about his experiences with graduate students taking Web-delivered courses in Technical Communication at Mercer University:

"No man or woman is an island, and the student is no exception to John Donne's general observation about humankind. A distance learning program that strives for quality and for the goal of self-discovery demands that there be a student-to-student and student-to-instructor interaction. The student must willingly participate as a team member with other students in the class, evaluating work, exchanging ideas, and building on the ideas of others." (p. 393)

His research supports a dynamic interactive communication component on the Web in addition to traditional on-site class meetings that are "essential to provide structure and cohesiveness to the group" (p. 399) Ignoring what had been written, primarily because I was not sure how to make asynchronous or synchronous communication work without forcing the behavior, was a mistake. I believed that scheduling regular class meetings would be enough to preserve the dynamic of interactive communication. However, student comments indicated that was not the case. In retrospect, another major contributing factor in my failure to provide sufficient interactive communication was an almost single-minded focus on converting my courses to an HTML format. Even though I was concerned about student interactions, my thinking and effort was consumed with understanding HTML editing software, gifs, jpegs, tables, frames, navigation and the like.

Care should be taken when drawing conclusions from only 52% student participation in the online evaluation. Why didn't the other 41 student respond to the online evaluation? Were they glad the course was over and didn't wish to spend any more time on it? Were the evaluation categories unclear in their minds? Did they have no opinion because they had not reflected on their experiences? I'll never know for sure. However based on participating student feedback that was frequently duplicated and analysis of the ten dimensions, I believe it is safe to do the following to improve my use of a hybrid approach to course delivery:

- Add one more face-to-face class meeting to each course (from five to six).
- Implement asynchronous and synchronous communication to engage students in discussions on various issues related to course content. The availability of new software will support this change.
- Ask for 100% student participation in completing future online course evaluations for more accurate decision making.
- Continue to develop a constructivist approach to student learning.
- Reassess cultural and ethnic diversity within the student population in our program.

Wisdom can be found in the voices of individuals as they live their own experience and reflect on its meaning. This particular study was a subjective analysis of one professor's experiences with his students. I will continue to make additional improvements and enhancements to the Web sites and the teaching/learning process to help students maximize their learning experiences.

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Student Comments to Online Course Evaluation

Liked Least

- As nice as it was not to have to drive to Winona for class, I missed the regular interaction and discussion with my classmates and you.
- Heavier workload than other courses. I considered the work load heavier because I was more responsible for my own learning and the traditional paradigm of teacher "teaching", student "listening" is a tough one to break after about 30 years of education.
- Honestly, not having to come to class 15 times, and also a new method of learning.
- It would have been nice to do more communicating between students via the Internet, but quite honestly, with all the work involved for this class and my job, I didn't have the time to use this forum other than to post my own articles. In a perfect world, it is a super tool. In my life right now, it was not attainable due to lack of time.
- Budgeting my time was difficult, although I knew that I needed to complete a certain amount of reading and responding so I didn't procrastinate too long!
- I am an auditory learner, so I find myself feeling a loss at not being able to share in the stimuli of discussions. I need the social community interaction to get my creative juices flowing.
- I missed discussing the topics with everyone present at the same time. I guess that is the biggest shortfall in my point of view.
- Not being in contact (face-to-face) with the instructor.
- The lack of structure, the lack of human contact to debate issues.
- The once a month classroom sessions could be more focused.
- I need to have more structure. I have found that I am the type of person that ends up saving a lot for the end.
- The solemness of working on course requirements It might be good to have a study group within geographic areas after the class rosters are set. We could get together once between monthly sessions, and send on a quick report of our discussion.
- Only 5 meetings throughout the semester
- Not enough time to meet as a class. What about bi-monthly gatherings?
- 3 1/2 hour ride home after classes.
- I would have liked more time to discuss the case studies. I learn better by sharing and listening to my peers.
- I felt that there was an overload of information with very little time to discuss all of it. More class time to process with peers would have been great.
- My responsibility to get online and to take time from work at school to do so.
- Obviously, I liked not having to be in class. But, I would suggest a few less articles and case studies with a couple more class meetings to go over the ones assigned. Less material with more indepth thinking on the ones you choose.
- We didn't meet enough in person. I do not like the Web format very much. I wish I would have know before I enrolled.

Liked Most

- The push to learn for myself, to struggle with some of the issues and the specific expectations, was aggravating but invigorating!
- I loved the course. I work full-time, and value my time after school. It was wonderful having the flexibility to do the work when it suited my schedule. Even when I was working, I was here at home with my children. I've never appreciated a class so much. Thank you! I feel I learned more than I usually learn in a traditional class. That is because the activities were designed to produce learning. Going to class each week does not equate to learning. However, doing something worthwhile does, whether it is a traditional class or not.
- Not having to drive to Rochester every week. Being able to set my own hours.....like 1:00 a.m. in the morning.
- It was great for someone who has to drive 150 miles round trip every week. I am very thankful. More so when the snow starts flying.
- Thanks for an awesome learning experience. This was my first time doing an Internet course. I

liked your balance of class time and Internet time. I strongly suggest you keep the five class periods. Do not ever go to just Internet. The people contact is still necessary, even though on the limited basis.
- Autonomy for our own work (even though it was difficult to do so)
- Being on the Internet. I learned more in this class than in the other. Mainly because I was responsible for the learning, the instructor was not.
- The opportunity to complete work at my own pace and when time allowed.
- The chance to visit with other members of the class and hear what problems they are facing.
- Thanks for all your work putting this course together. It was very easy to follow and to use. The convenience of a class on the Internet is great especially for extremely busy people!!
- The convenience of the Internet! It forced me to use the Internet and not be afraid of it. The result was that I loved it!!
- Convenience was great!!!!! It is very difficult and tiring to drive two hours a night for class, especially if it were to meet weekly. I think there would be a way to have the structure that I need, but still have a Web class. I wouldn't give up on this at all!!!
- The self paced online use of the Internet and the Web. The instructor and his style of teaching/encouragement of learning.
- Because I was responsible for my learning and I couldn't count on someone else to "hog" the class discussion, I feel my level of participation was up for this class, even though it was via the Internet. I don't really like to participate in class discussions. This is a much safer vehicle for me to express my opinions.
- Much more that just a discussion course.
- I disagree with those people that suggest we meet "physically" more often. Why do we look at something new and progressive and try to find a way to drag it back into our 20th Century vision of education? Break the mold! In the 21st Century more distance learning will take place and more emphasis will be placed on students being responsible for there own learning. Instead of looking to meet more often...I suggest meeting less often and finding a way to improve the technology so we can do a real time conference over the net.
- Time is the most valuable commodity we have in our lives. I waste a tremendous amount of time on the road traveling to classes. Why can't I sit down at my computer at 7:00 at night on a Monday and meet with other students who are taking the same class over the Internet?
- The whole Web format was well produced and maintained. Class time was a bit rushed, but the personalized Web format made the class rewarding and insightful.
- I liked the flexibility of this course. This is an area that I want to go into, but I would be unable to do the course work had I been required to drive to Winona every week. It was also nice to be able to do it at my own pace. I have many things in the works and liked being able to work at this course when it suited my schedule.
- You have obviously put a lot of time and effort into this class in hopes of saving others time and travel while maintaining a high level of academic rigor. Your Web site was amazing and improved over the duration of the semester. This would be very difficult (a concern) for those who were not familiar with the Internet.
- The combination of face to face and online.
- The independence we had as students, as far as being able to log on any time, any place instead of a fixed time.

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Accessible Web-based Distance Education: Principles and Best Practices

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Abstract

The issue of accessible Web design for people with disabilities and other special needs has recently become a topic of great concern. Participants in online activities include an increasing group of users with sensory, physical or learning disabilities, for whom adaptive technologies provide a gateway to information and education. Current estimates based on U.S. Statistics suggest that approximately 8% of computer users have some type of disability. In the US, the Americans with Disabilities Act (ADA) legislation and the Rehabilitation Act 508 requirements for Federal Departments and Agencies have recently put accessibility issues into the spotlight. Furthermore, today's technological environment is fostering public demand for accommodation of a growing number of user interface models, ranging from screen readers to palm pilots to telephone browsers. All of this points to the need for Web authors to increase their understanding of the principles of universal design.

In the field of education, we also face new challenges related to the increasing demand for provision of course related resources and documents via the Internet. Use of the Web for delivery of distance learning is finding an audience in the current "just-in-time" education environment, where customized programs and convenient professional development opportunities are valued by today's lifelong learners. In addition, students in traditional facilities-based courses are also asking for the convenience of access to course resources, information, and communication with their instructors via the Internet. Now, as we stand at the beginning of a new era in education, we must take steps to ensure the accessibility of online educational resources to users of adaptive technology, or learners with disabilities. To this end, it is essential that educators and administrators are astute in their selection of courseware tools, and their development of Web-based instructional strategies. The provision of access support and information via courseware and Web authoring tools supports the principles of universal design and access to education for all learners.

The potential benefits of Web-based learning resources for students who use adaptive technologies are many, as the electronic delivery of information and resources permits translation into a variety of modalities and formats

Making the Web more accessible is dependent upon using HTML the way it was intended: to encode meaning. Some years ago, the introduction of graphical browsers, led to a variety of new official and unofficial HTML formats which were quickly taken up by Web designers. Adaptation of the structure of HTML for aesthetic purposes compromises the accessibility of the site using non-visual, or non-conventional browsers. The increasing use of graphics, non-standard HTML structure, and the introduction of dynamic elements such as Java applets and active-X controls has further compounded the problem.

As well as retrofitting resources to allow access by students with disabilities, educators and Web authors must be encouraged to create materials in accessible formats from the beginning. This presentation will outline best practices for accessible HTML authoring, and a review of current courseware products in terms of their accessibility to students with disabilities.

Accessible Web-based Distance Education: Principles and Best Practices

Introduction

The issue of accessible Web design for people with disabilities and other special needs has recently become a topic of great concern. In this investigation of Web-based Distance Education, points of discussion related to the creation of accessible resources will include:

- Universal design principles
- Relevant legislation
- Reaching the widest possible audience
- Accessible design: Where does it begin?
- General principles
- Basic strategies to ensure accessible design
- Choosing courseware tools

Participants in online activities include an increasing group of users with sensory, physical or learning disabilities, for whom adaptive technologies provide a gateway to information and education. Current estimates based on U.S. Statistics suggest that approximately 20% of the population have some type of disability.[1] Legislation in both Canada and the USA supports development of accessible standards for Web-based resource development. Furthermore, today's technological environment is fostering public demand for accommodation of a growing number of user interface models, ranging from screen readers to palm pilots to telephone browsers. All of this points to the need for Web authors to increase their understanding of the principles and practices which support universal design.

Universal Design Principles

Why should developers take the time to ensure that Web-based educational resources are based on universal design principles? There are several factors that should motivate us to learn about accessible design, and implement it in our online programming. The first is a fundamental ideal that access to education is one of our basic human rights. Accommodation of learners with special needs is part of the process of ensuring that high quality educational experiences are available to every individual.

We are currently in the midst of a rapid evolution in availability of adaptive technology that removes barriers to accessing information and education for people with disabilities. A potential learner may have differences in how they interact with a computer, including both hardware and software, input and output. A sensory impairment may result in a need to use screen reader software to hear the information instead of viewing it on a screen. Limitations in mobility could mean that the student uses an adapted keyboard to navigate the Web. However, these individuals are fully capable of participating and contributing to a learning community. Education delivered via the Internet provides an opportunity to level the playing field for learners with special needs through use of new technologies, in combination with thoughtful design of the user interface. The technology is available, but the onus now rests with designers to present Web-based resources in formats that are accessible to a full range of learners. As an extension of the principle of universal education, we must become aware of principles of universal Web design.

At present, the leader in establishing accessibility guidelines for page authoring is the Web Accessibility Initiative (WAI), a sub-committee of the World Wide Web Consortium (W3C). The mission of this group includes promotion of a high degree of usability for people with disabilities. To this end, the WAI is coordinating many organizations that have developed Web accessibility guidelines in the past, in order to develop a comprehensive and unified set of accessibility guidelines. The most recent set of authoring guidelines categorizes, by priority, elements and formats to avoid and recommends possible redundancies or alternatives, in an attempt to establish universal standards for accessible Web design.[2] The WAI guidelines and resource documents are available at http://www.w3c.org/wai

Legislation

In Canada, the *Human Rights Code* protects citizens against any "discriminatory practice in the provision of goods, services, facilities or accommodation customarily available to the general public." [3] While there is currently no federal legislation that specifically directs the development of accessible Web resources, the Government of Canada is developing a policy that will mandate the accessibility of all of its Web sites and electronic information products and services. This legislation, based on the W3C-WAI guidelines, is expected to be implemented in 1999, with Web sites being brought into compliance over a two-year period.[4]

Further policies are currently being developed by the Canadian Radio-television and Telecommunications Commission (CRTC)[5] and the Ontarions with Disabilties Act (ODA) in support development of accessibility standards, encompassing Web-based delivery of information and resources.

In the US, the *Americans with Disabilities Act (ADA)*[6] legislation and the *Rehabilitation Act 508*[7] requirements for Federal Departments and Agencies require that Web resources must be made accessible to people with disabilities.[8] The ADA directs organizations falling within its scope to provide appropriate auxiliary aids and services where necessary to ensure effective communication with individuals with disabilities, unless doing so would result in a fundamental alteration to the program or service or in an undue burden.

A more specific description related to education has been identified by Cynthia Waddell, ADA Coordinator, City of San Jose, CA USA, in her research for the American Bar Association:

In a complaint by a student that a university had failed to provide access to the Internet, the Office of Civil Rights, United States Department of Education (OCR) discussed what was meant to provide effective communication. In a nutshell,

> *[T]he issue is not whether the student with the disability is merely provided access, but the issue is rather the extent to which the communication is actually as effective as that provided to others. Title II [of the Americans with Disabilities Act of 1990] also strongly affirms the important role that computer technology is expected to play as an auxiliary aid by which communication is made effective for persons with disabilities.*

II. United States Department of Education, Office of Civil Rights, Settlement Letters: Docket Number 09-95-2206 (1996 Letter)& 09-97-2002 (1997 Letter) Pages 1-2, 1996 Letter; 28 C.F.R. 35.160(a)[9]

Further, the *Rehabilitation Act 508* indicates that Federal Departments and Agencies are required to ensure electronic and information technology allows access by Federal employees with disabilities, as well as members of the public seeking information or services from a Federal department or agency.[10]

Reaching the Widest Possible Audience

In the field of education, we are all experiencing the exponentially increasing demand for provision of course related resources and documents via the Internet. Use of the Web for delivery of distance learning is finding an audience in the current "just-in-time" education environment, where customized programs and convenient professional development opportunities are valued by today's lifelong learners. In addition, students in traditional facilities-based courses are asking for the convenience of access to course resources, information, and communication with their instructors via the Internet. Library reference services are being adapted to take advantage of the possibility of Internet access to information systems and database mining tools.

We may have an image in mind of a "typical" learner, who sits at a desk using a conventional keyboard, mouse and monitor. But it is important to consider demographic trends, health trends and technological trends, to ensure that we are reaching the widest possible audience. An aging population, in combination with the demand for lifelong learning, has lead to an increase in the number of users who have some degree of vision impairment.[11] Additionally, workplace environments have unfortunately resulted in a dramatic increase in the number of learners who suffer from repetitive strain injury.[12]

The potential benefits of Web-based learning resources for students who use adaptive technologies are many, as the electronic delivery of information and resources permits translation into a variety of modalities and formats.

Benefits include:

- flexibility in the pace of learning,
- material can be presented in redundant, reinforcing or alternative formats e.g., speech, print, graphics, etc.,
- material can be adapted to various learning styles,
- student can clarify, rehearse and review supporting materials without interrupting the flow of the learning session for classmates,
- issues of distance, transportation and physical accessibility are reduced,
- equal participation for students who use augmentative or alternative communication methods, as the method and rate of communication is transparent to fellow classmates,
- greater opportunities for peer interaction and collaboration, and for student-instructor interaction and assistance[13]

Another trend is the rapid development of alternative devices such as mobile computing devices, "hands-free" and "eyes-free" browsers and "virtual books" to access information and resources in contexts other than the conventional desktop workstation. Not all methods of accessing the Web incorporate a graphical pointing device such as a mouse. Web pages based on principles of accessible design should be navigable via keyboard or voice commands. While the functionality of these devices is determined by the product developers, strategies may be implemented to enhance access and avoid unnecessary barriers being created.

Forward thinking developers will recognize the need to plan for changes linked to demographic and technological trends. To this end, it is essential that educators and administrators are astute in their design of Web-based instructional resources, and in their selection of courseware tools. Building on a solid foundation which includes adherence to W3C HTML standards and accommodation of a full range of interface models will increase the life span of the resources we develop, ensuring access by the widest possible audience at present, and in the future.

Accessible Design: Where Does it Begin?

A useful definition of accessibility is provided by Chuck LeTourneau, of Starling Web Services, an organization that specializes in accessible Web design. He states:

"What does 'Web accessibility' mean? To me, it means that anyone using any kind of Web browsing technology must be able to visit any site and get a full and complete understanding of the information as well as have the full and complete ability to interact with the site - if that is necessary." [14]

In order to understand the issues related to accessible Web design, developers need to first have a basic understanding of specific access systems that accommodate, replace or augment sensory and motor functions of users with special needs. These include voice recognition systems, alternative pointing devices, screen readers / magnifiers, and other devices. The following is a list of some adaptive technologies[15] and examples of basic challenges[16] to Internet navigation faced by users of these devices.

Screen Readers

This software is used by learners who are blind to access Web pages, electronic text and computer applications. This software allows all text to be read out from the menu, toolbar and directory buttons, and Web pages. Tab or Shift-Tab allows navigation through the Hyperlinks on a given page.

Challenges: Frames and tables can make a page difficult, if not impossible to navigate. Some screen readers cannot distinguish columns or groupings of graphics with labels and may read horizontally across the page, mixing text with images, labels and hyperlinks. Images that may provide important information cannot be accessed unless text-based equivalents are provided.

Screen Magnifiers:

Screen magnification systems enlarge portions of the screen to allow learners with limited vision to access computer based materials.

Challenges: Without clear and easy-to-understand text and descriptions of the layout of the site, the user may have difficulty getting a sense of the overall structure of the site, or become lost in complex pages.

Alternative Keyboards:

These keyboards offer larger or smaller target areas for users with loss of gross or fine motor control. They may be switched to mouse emulation mode so that the arrow keys or numeric keypad of the same keyboard are used for mouse movements.

Challenges: Mouse emulation can be somewhat slow or frustrating, although keyboard equivalents to tab through hypertext links which have been built into recent Web browsers are very helpful. Because the pointing device is less precise, users may need larger targets or increased spacing between targets.

On-screen Keyboards:

This software allows the user to enter text and select buttons emulating menu functions from a display on the monitor. Users have a pointing device or a switch to select buttons.

Challenges: Recent products allow users to point and dwell over a target to make a selection, but navigation through a complex series of menus and links can be difficult. Text entry is also possible using this technology, but is very time consuming, unless accompanied by word prediction technology.

Voice Recognition:

The user speaks into a microphone to navigate software applications, surf the Web, and input text. Commands correlating to macro sequences may be created to customize usage for specific software or frequent tasks. Mouse control may incorporate a grid system.

Challenges: Again, without a clear navigation system and large target areas on clickable images, the voice recognition user has difficulty in moving through the pages efficiently.

A basic understanding of these commonly used adaptive technologies, is the first step in learning to design Web pages that will make information accessible to users of these adaptive technologies.

Best Practices for Accessible Design

Making the Web more accessible is largely dependent upon using HTML the way it was intended: to encode meaning and structure, rather than control layout and visual formatting. Some years ago, the introduction of graphical browsers, lead to a variety of new official and unofficial HTML formats which were quickly taken up by Web designers. Adaptation of the structure of HTML for aesthetic purposes compromises the accessibility of the site using non-visual, or non-conventional browsers. An example of this phenomenon is the case of the TABLE tag that was originally conceived to display tabular data, but has become an all-purpose tool for laying out magazine-type pages. The increasing use of graphics, non-standard HTML structure, and the introduction of dynamic elements such as Java applets and active-X controls has further compounded the challenges in designing universally accessible Web pages.[17]

General Principles:

Knowledge of the following general principles, based on WAI approach to accessible design will help the designer to achieve greater level of accessibility in the learning resources being developed.[18]

1. Use structural elements as they were intended.

As was mentioned previously, one of the greatest barriers to accessibility is inappropriate use of structural markup to achieve visual formatting effects. Using markup improperly may create a barrier preventing users with specialized software from understanding the organization of a page, and navigating through it effectively. Web designers may be tempted to use structural markup to achieve a desired formatting effect, especially for viewing with older browsers. Common practices include use of tables for layout or a header to change the font size. It is important to consider whether the formatting effect is so critical as to warrant rendering the page inaccessible to some users. Not everyone uses a conventional monitor and mouse to access the Web. A better approach is to use markup such as TABLE, UL, BLOCKQUOTE, etc. as it was intended, and use CSS to format visual effects for those learners using conventional desktop system. CSS is a forward thinking technology that assists the Web designer in separating structure from format, content from presentation. This accommodates users of adaptive technology, as well as users of new, mobile and portable Internet access devices.

2. Provide equivalent alternatives to auditory and visual content.

When providing critical information in strictly visual, or auditory formats, be certain to include alternatives for those learners who may not be able to access these resources. A simple example is the use of the "ALT" attribute, of the <IMG> tag, providing an alternative text for users who are not displaying graphics. This will accommodate learners accessing Web resources with a screen reader, with graphics turned off because of low bandwidth issues, or those who are using devices which display text only. Scripts, sound files, objects, java applets, and other interactive components should also be rendered in alternative formats.

3. Add accessibility features to ensure pages can be navigated by keyboard only.

Again, remember that not all users can use, or will be using a mouse to navigate your Web pages. Good Web design means that the page can be accessed using only a keyboard or voice commands. Common pitfalls include use of image maps without ALT tags for each "hotspot." You can also use HTML 4.0 features such as ACCESSKEY and TABINDEX to make your pages easier to navigate using only a keyboard.

4. Ensure graceful transformation.

With some effort, Web designers can create pages that transform gracefully. Pages that transform gracefully will be accessible to a variety of users despite any physical, sensory, and cognitive disabilities, work constraints, and technological barriers. Strategies already mentioned include separation of structure from format, providing textual as well as visual information, and creation of documents that do not rely on one type of browser or hardware. Pages should be usable by people using a keyboard, with small or low resolution screens, black and white screens, no screens, with only voice or text output, etc.

Basic Strategies to Ensure Accessible Design

With so many "bells and whistles" available via authoring tools, one is easily tempted to implement design elements that in the end may actually impede, rather than enhance, the learning process for computer users with special needs. The following tips, based on the Web Accessibility Initiative guidelines, will assist you in ensuring that your Web site is reaching the widest possible audience.[19]

1. Images & animations. Use the alt attribute to describe the function of all visuals.

Rationale: Since text content can be presented to the user as synthesized speech, braille, and visually-displayed text, this improves accessibility for people who cannot access visual information or written text, including many individuals with blindness, cognitive disabilities, learning disabilities, and deafness.

2. Image maps. Use client-side MAP and text for hotspots.

Rationale: Client-side image maps are preferable because link information is located in the HTML document and can be accessed using alternative browsers. Server-side image maps may require use of a mouse or other pointing device. Text equivalents are helpful for the reasons outlined above.

3. Multimedia. Provide captioning and transcripts of audio, descriptions of video, and accessible versions in case inaccessible formats are used.

Rationale: Although some people cannot use movies, sounds, audio enhancements, etc. directly, they may still use pages that include equivalent textual information to the visual or auditory content.

4. Hypertext links. Use text that makes sense when read out of context.

Rationale: Link text should be meaningful enough to make sense when read out of context–either on its own or as part of a sequence of links. For instance, do not use "click here." Link text should also be terse.

5. Page organization. Use headings, lists, and consistent structure. Use CSS for layout and style where possible.

Rationale: Use structural markup to aid navigation rather than for a presentation effect (e.g., using a table for layout or a header to change the font size). Correct use helps learners with specialized software to understand the organization of the page and to navigate through it.

6. Graphs & charts. Summarize or use the longdesc attribute.

Rationale: When a short text equivalent does not suffice to adequately convey the function or role of an image, it is helpful to provide additional information in a file designated by the "longdesc" attribute or by provide a description link as well next to the graphic. (See WAI guidelines for more information.)

7. Scripts, applets, & plug-ins. Provide alternative content in case active features are inaccessible or unsupported.

Rationale: To reach the widest possible audience, ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page.

8. Frames. Label with the title or name attribute.

Rationale: Although content developers are encouraged to use new technologies that solve problems raised by existing technologies, they should know how to make their pages still work with older browsers and people who choose to turn off features. For non-visual users, relationships between the content in frames (e.g., one frame has a table of contents, another the contents themselves) must be conveyed through other means.)

9. Tables. Make line by line reading sensible. Summarize. Avoid using tables for column layout.

Rationale: Tables used to lay out pages and some data tables where cell text wraps pose problems for older screen readers that do not interpret the source HTML or browsers that do not allow navigation of individual table cells. These screen readers will read across the page, reading sentences on the same row from different columns as one sentence.

10. Check your work. Validate the HTML. Use evaluation tools and text-only browsers to verify accessibility.

Rationale: Validate accessibility with automatic tools and human review. Automated methods are generally rapid and convenient but cannot identify all accessibility issues. Human review can help ensure clarity of language and ease of navigation.

This list of quick tips is a starting point for ensuring that your pages are accessible. More detailed information and techniques for implementation are available in full at the WAI Web site at http://www.w3c.org/wai. It is advisable to begin using validation methods at the earliest stages of development, and discover the problems before you are well into site construction. Accessibility issues identified early are easier to correct and avoid.

Choosing Courseware Tools

An exponentially increasing number of educational courses, from all sectors, are being offered over the Web. This has spurred a growing industry of software tools to assist in creation of Web-based curriculum and in performing class management tasks. Web server software such as WebCT, TopClass, CourseInfo, Virtual-U and other programs will take HTML documents, along with other media and resources, and quickly organize them into a framework specifically designed for delivery of Web-based courses.

Courseware products cater to educators who are unfamiliar with programming, allowing easy integration of password protection, interactive activities, tracking of student progress, etc. Generally, the interface is fairly simple for the designer, as many use templates and wizards extensively to assist in course content creation. Step-by-step guides support creation of a range of components, from the course home page, to bulletin boards, to quizzes and marking systems. Multimedia components, such as images or audio files, are generally created externally in a specialized software program, and imported. Many feature a designer interface which is driven by a program residing on the server, accessed through a browser. While this is convenient in terms of software access and cross platform issues, the automation can give the educator less control of the final formatting of the HTML pages.[20]

Thus, while Web-based distance education programs built on courseware platforms address geographical and cost barriers, they frequently present access barriers to students with special needs. Ironically, very few include basic accessibility features described above, effectively excluding those individuals who stand to benefit most from new technologies.

In order to encourage developers of these courseware products to become more aware of accessibility issues, the Adaptive Technology Resource Centre recently undertook a study of products currently available on the market and evaluated them in terms of overall functionality in relation to accessibility. The results of this study are available at http://snow.utoronto.ca/best/crseval.html.[21]

Results of this evaluation show Lotus Learning Space as the most accessible of the packages assessed, with Web Course in a Box and TopClass doing well, although with less functionality. It should be noted, however, that all of these courseware developers have a long road to travel in terms of providing tools to create accessible learning environments. There are no products on the market which adequately address accessibility issues, and the designer/instructor is often left with the task of finding "workarounds" or developing alternative access methods in order to accommodate users of adaptive technology. One of the most significant long term strategies that should be taken as educators is to lobby courseware platform developers to modify their programs to improve accessibility. This grassroots approach, beginning with authoring tools, will mean that accessible design becomes the status quo, rather than an additional effort undertaken by designers who have awareness of the potential problems. [22]

Summary

Achieving universal access to education, reaching the widest possible audience, looking to the future of

computer interface and emerging technologiesÖ the motivators behind development of accessible Web-based learning resources are many. Improving accessibility begins with increased awareness of the potential barriers. As educators, we must be astute in selection of courseware tools and encourage use of products and methods that allow development of accessible resources based on principles of universal access. Just as wheelchair ramps to buildings have become the norm in architectural design, accessible Web design must become a basic consideration in the design of Web-based learning resources.

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Recent Achievements:

- Curriculum coordinator for SNOW, developing and moderating online courses for educators of students with special needs
- Online moderator for NODE forum: Online by Design
- Guest lecturer at FedWeb99, coaching Web designers from US Federal Agencies in accessible design.

Katharyn Foster works as a program coordinator at the Adaptive Technology Resource Centre, University of Toronto, specializing in issues related to access to information and education. Her expertise is based on 15 years working in the disabilities community, and additional experience as a partner in a Multi-National Consulting Firm.

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Multi Tiered Technology Interventions: The Virtual Business Training Center, an Online Corporate University

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Abstract

The Virtual Business Training Center (VBTC) is an integrated business resource center that provides business users with access to online training, market research, project management, and other project based resources. The VBTC will also function as a business lab and virtual internship for Ohio University students.

We have begun an innovative "cluster" class offered to Business Management Majors and Accounting Majors that will be completed entirely online. The two combined courses (cluster) include a Small Business Management course and a Accounting Special Topics applications course. This cluster course functions as a Virtual Corporate University for a group of sport enthusiasts and entrepreneurs that desire to start up a new Golf Course and accompanying sports complex. This multi million dollar venture requires a full business plan that will be used to secure needed financing from banks and venture capitalists. The business planning activities include market research, operations planning, and financial planning. This business project will be completed entirely online using an interactive Web-based platform, desktop video conferencing, and compressed video. Our interaction with business partners and student teams will maximize both the synchronous and asynchronous benefits of our online approach. This type of actual business project requires close and frequent interaction between business partners and student teams. In addition to business faculty participation we have included outside source expertise by including online partners in banking, a lawyer, an accounting firm, a competitor source, and another small business entrepreneur. The dynamics of an actual business project requires skill and knowledge interventions delivered "Just in Time" for students and business partners to complete key components of their project. These synchronous and asynchronous work activities include online interviews, chat function brainstorming, real time desktop video conferencing spreadsheet work, and interactive Web-based posting of video clip presentations of data or analysis.

Multi Tiered Technology Interventions: The Virtual Business Training Center, an Online Corporate University

Introduction

Business education and the workplace don't always share similar environments or performance development interventions. There is a new and innovative performance development intervention that can dramatically impact the successful completion of project work by teams in both business classes or the competitive workplace. Using several tiers of online technologies will prove to be a significant means to improve the performance of project teams. Many business classes use a project and team approach to delivering important business information and some entire business curriculum are based on this approach. All dynamic business activities (all activities not handled by ongoing processes such as problem solving, product development, market analysis, etc.) are handled on a project basis with many in a team format. Both environments work hard at improving the success of their project management activities and need stronger interventions that will increase the outcome performance. An innovative use of online technologies is not just an alternative to be used in project based business classes, it is a *better* platform. An online platform in an education setting will increase participation of students, provide more opportunities for critical thinking, enhance communication between team members, enhance communication between business sponsor/faculty facilitator/student team, increase probability of achieving required deliverables, quicker responses to faculty interventions, project closer to planned timeline schedule, more communication between team members, clearer exhibition to business skills and knowledge, more cohesive group work, project completion closer to planned specifications, earlier interaction with facilitator/faculty, earlier interaction with business sponsor, and greater number of

outside experts involved with project. An innovative use of online technologies is not just an alternative to be used in workplace projects, it is a *better* platform. An online platform in a workplace setting will optimize employee's time on project, reduce costs, maximize outcome performance, stronger support to keep project on timeline, more effective project status reporting, increased and more effective interaction with internal (executive) or external (customer or supplier, sub contractors) sponsors, tracking of project progress is more efficient, maximize team member expertise, allow team members from different locations to have full participation, and improve the efficiency of other work activities and project work (Hoyt and Stockman 1999). The three pieces in our Multi Tier Online Platform include

- compressed video
- desktop videoconferencing
- interactive Web-based data base

After many independent online business projects we designed a framework that will house ongoing online project activities for both student and business usage. Our platform will serve as an "corporate university" incubator site for small and medium size firms and provide virtual training experiences for students. Research, training course development and delivery are just a few of the offerings to companies with limited funds or online training expertise.

Recent research indicates that online learners perform better than in traditional environments (Navarro and Shoemaker 1999). Although their work focuses on the benefits of online deliveries versus traditional classroom delivery it also recognizes another difference. Navarro referenced a difference in interaction among various online interaction tools. Those online tools that increase interaction impacted learning performance–more interaction = more success (http://powerofecon.oac.uci.edu/).

Our multi tiered online platform (compressed video, desktop videoconferencing, interactive Web site) expands the contact opportunities of remote team activities. No team is in constant proximity or communication yet coordination, collaboration, and communication must take place for successful completion of a project. This innovative platform and approach positions team members and their work at immediate access and facilitates more sharing of information. It encourages greater participation and enables technical expertise to intervene earlier and more often. These improved access and interaction levels maximize the resources available for effective task completion and overall project success. Our approach has more interaction and access than Navarro's experience and should provide greater success than his stated conclusions (Hoyt and Stockman 1999).

In a recent INC magazine article staff writer Marc Ballon interviewed Brandon Hall on the anticipated growth of corporate distance learning. He indicated that computer skills and sales management training were heading the list of offerings (Ballon 1999).

Our most recent project completed was the pilot for the Virtual Business Training Center /Corporate University Incubation site. We anticipate problem solving, market research, and project management and business planning will be our specialties. We have just completed an innovative "cluster" class offered to Business Management Majors and Accounting Majors that was completed entirely online. The two combined courses (cluster) include a Small Business Management course and a Accounting Special Topics applications course. This cluster course functions as a Virtual Corporate University for a group of sport enthusiasts and entrepreneurs that desire to start up a new golf course and accompanying sports complex. This multi million dollar venture required a full business plan that will be used to secure needed financing from banks and venture capitalists. The business planning activities include market research, operations planning, and financial planning. This business project has been completed entirely online using an interactive Web-based platform, desktop videoconferencing, and compressed video. Our interaction with business partners and student teams will maximize both the synchronous and asynchronous benefits of our online approach. This type of actual business project required close and frequent interaction between business partners and student teams. In addition to business faculty participation we have included outside source expertise by including online partners in banking, a lawyer, an accounting firm, a competitor source, and another small business entrepreneur. The dynamics of an actual business project requires skill and knowledge interventions delivered "Just in Time" for students and business partners to complete key components of their project. These synchronous and

asynchronous work activities include online interviews, chat function brainstorming, real time desktop videoconferencing spreadsheet work, and interactive Web-based posting of video clip presentations of data or analysis.

The following description of our Virtual Business Training Center offers some detail regarding our framework.

Multi Tiered Technology Interventions: The Virtual Business Training Center, an Online Corporate University Incubation Site.

The Virtual Business Training Center (VBTC) is an integrated business resource center that provides business users with access to online training, market research, project management, and other project based resources. The VBTC will also function as a business lab and virtual internship for Ohio University students. Our online and interactive format will provide users with:

- Small Business / Entrepreneurship Coordination

- Project Management
- Business Plan work
- Continuous Improvement problem solving

- Market Research Coordination

- Online research
- Phone surveys
- Mail surveys
- Web surveys

- Company Training Coordination

1. Continuous Improvement
2. Project Management
3. Technology / Software

Interactive Learning

The Virtual Business Training Center is designed to help build skills needed to function and succeed in a project driven workplace. It is a continuous learning environment that provides users and students with necessary interventions in the project management, an advantage in bringing projects to successful completion.

Technology Elements of Virtual Training Center / Virtual Corporate University

This multi tiered online site leverages the power of desktop videoconferencing, an interactive Web-based platform, and compressed video to deliver a range of business services to business users and offer a complete learning experience for students. Business, faculty and student users can access statistical data analysis, reference materials, continuous improvement problem solving activities, market analysis information, and technical / software support at their own pace, time, and convenience. All partners of the Virtual Training system can access this information in both synchronous and asynchronous technology elements.

Benefits

We anticipate benefits for both business and student users as a result of this approach, as outlined below.

Business Users

- Cost efficiency for training / project management
- On demand interventions and interactivity
- Maximum flexibility of training resources / business information
- Improved recruitment and revenues
- Reduced employee turnover
- Better employee advancement

Student Users

- Dynamic learning environment
- Interdisciplinary opportunities
- Collaborative teaching environment
- Interaction with business executives and managers
- Virtual internship opportunities
- Use of advanced technologies and online training techniques

Success Determinants for Team Projects — Access & Interaction through Online Facilitation

Business projects and classroom projects (business or other types/disciplines) have common success determinants and common barriers/problems. A project team's effectiveness is always measured by their ability to reach stated goals, speed — throughput rate of project completion, stamina — the ability to finish projects and then move to the next project, and the contribution of the output to the organization. Dean and Evans describe quality problem solving teams with similar effectiveness criteria (Dean and Evans 1994)and recognize that the consequences of poorly run projects or ineffective teams can have a dramatic impact on an organization's competitive advantage. Any project's success is measured by three primary criteria; Achievement of Specifications, Time Schedule adherence, and Cost controls such as hours, $, etc. (Kerzner 1998). Achieving specifications includes reaching the project objectives and purpose from the customer/sponsor's perspective. Is the final outcome or deliverable the same as the target? Does the final outcome/deliverable provide the intended benefits? Adherence to the time schedule is defined by meeting the intended finish target date or key milestone dates. Cost control includes the evaluation of meeting the targets of projected allocation of resources (people, supplies, expenses, materials, etc.). Some experts target communication issues, coordination of activities, and skill levels of team members as the key opportunities for project teams to improve goal attainment, project completion, and schedule variances (Dean and Evans 1994). Hoyt's hands on experience with workplace problem solving teams, project teams, and student teams the past 20 years has convinced me that the most significant reasons teams are less effective than they can be or need to be has to do with two key factors, access and interaction interventions. Work teams that exhibit poor performance always exhibit poor communication, coordination, and skill gaps but some successful teams also exhibit those traits some time during the project experience. Our most recent applications with online facilitation that maximizes access and interaction has convinced us that we have a better approach and means to improve project work in both education and the workplace. The combination of team effectiveness criteria and project effectiveness criteria is the arena or environment where technology as an intervention can provide the necessary advantage that facilitates and maximizes team and project success. Technology is not the answer, access and interaction is the answer. Specific online technologies maximize the facilitation of access and interaction for teams and projects. All of the effectiveness criteria and team dynamics can be dealt with by opening up more opportunities and better options for interaction and access within the project's life. All project participants (education and business) can move within the project information using this platform without restrictions of meeting times, other work activities, or travel. Using this new platform there is an increase of communication, participation, and work input of sponsors, experts, and team members (Hoyt and Stockman 1999)

Although we have focussed on bringing the online applications to the user consistently through the browser alone, for a number of reasons we implement a variety of tools on the server side to accomplish our goals. Each product first needs to fit our end user driven system of pushing applications through the browser. Following the philosophy of using technology only for those things we have a need, when something comes up in a class/project that presents a problem we find a technological piece to fit that

need then purchase and/or create it alone. Many times in the process of building the technical backbone of our systems there simply was nothing available that performed every function we needed forcing us to use a mix of server products. Funding plays another key role, not often do we have the resources to buy the "complete package" of online applications, and sometimes we must do with what we have when making decisions. Finally, some things we implement and use because it is what we have in house at the time and already know how to administer, such as the Windows NT server.

Server products currently used at Ohio University-Lancaster include:

Windows NT Server - base server platform (www.microsoft.com)

Lotus Domino - Web server, user authentication and discussion boards with attachment capabilities (www.lotus.com)

Webmaster Conference Room - Web or IRC (Internet relay chat) accessible text based chat rooms (www.Webmaster.com)

Pirch IRC software - used to log transcripts of all chats

ON Technology's Meeting Point - multicast video server for desktop videoconferencing (www.on.com)

Real Networks Server - delivery of real audio/video content (http://www.real.com)

There are many products which will accomplish the same results, each organization needs to evaluate their need of each, based on individual situation and resources. If your school or company does not have a direct Internet connection or an onsite Web server, many Web site housing companies will provide some of these services within their monthly fees. Costing anywhere between ten and several hundred dollars per month, companies will house your Web site and give you many of these options within your site, you generally still must administer your own pages however. This approach may reduce some of the flexibility and control you have over your site but can be cost effective and a good option if your organization is just starting out or short on technical skills and resources. Some of the solutions can also be found free at other Web sites over the Internet, such as the chatrooms, but again you will lose some of the control and flexibility and may have to deal with unwanted advertising.

We have found this mix of solutions on the server side to produce the best results in the classroom and/or project, though it can put a strain on the technical staff administering the servers, particularly if they are not flexible or unwilling to learn or think through the various components. On our discussion boards for example, we chose Lotus Domino without any prior technical knowledge of the product which ended up, while powerful and a very good system, being quite different to administer than many other products creating a rather large learning curve in the beginning. The technical staff must have a vision and knowledge of Internet technologies today and what is on the horizon.

Perhaps the biggest key to success we have found in administering online applications for project work or courses is continual communication between the technical staff, the faculty or project administrator and the end users. Without this communication one of the two necessary factors or implementing technology for a purpose and user friendliness will falter. This communication can be a Web page with instructions on using the technology, email between the tech staff and project administrators, a discussion board for users to post problems and questions about the technology, etc. The application of these platforms can also be described as they support project activities. The following review highlights the platform as it supports Access and Interaction.

Access components

Access components include information, expertise, and sponsors.

- Information

- Schedule
- Work in Progress
- Problems, questions, issues

- Expertise

- Technical (project management, design, market research, etc.)
- Business software applications (spreadsheets, desktop publishing, scheduling, statistical analysis, etc.)
- Strategy (customers, consultants, Trade Associations, etc.)
- Training (Continuous Improvement, software, project management, etc.)

- Sponsors

- Customers
- Suppliers
- Internal (Executives, Corporate, Functional Managers, Faculty, Project Managers, etc.)

Interaction components

We will discuss four kinds of interaction: synchronous interaction, asynchronous interaction, just-in-time interventions, and interactive tool selection.

Synchronous interaction includes project status, work activities, strategy interventions, etc.–discussing, meeting, and working together at the same time. All of these activities can be done with some or all of the team members at remote locations.

Asynchronous interaction includes work in progress, general communication and coordination of activities–discussing, meeting, and working at separate times on the same information. All of these activities can be done with some or all of the team members at remoter locations.

Just-in-time (JIT) interventions involve the facilitator at the work team's time of need. When so much information is available so quickly on team activities, progress, and data the opportunity to intervene with timely expertise increases. When a work team is approaching a pivotal problem solving sequence (data analysis and evaluation) the facilitator (faculty or project manager) can arrange software or statistical analysis interventions. A facilitator can "see" the team's up to date and continuous progress and post a video clip, outline, and analysis template on their discussion board using the teams actual data. Project team members can access the video clip file/mini lecture, review the outline alone and then as team online, and get started with template (Excel spreadsheet, SPSS statistical software, or Statistical Process Control software) to move project forward with out any unnecessary delays.

Interactive tool selection in a Web-based environment offers a wider and fuller use of deliveries for interaction (using online platforms and electronic communication tools). This is in comparison to narrow and restrictive classroom lecture or conference room meeting environments. The following section on technology platforms describes key components and usage of several electronic communication tools. The descriptions demonstrate the breadth and depth of various tools that better link theory and skills, provide more options for differing learning and working styles, maximizes a collaborative learning and performing environment, and builds strong novice-expert relationships.

Technology platforms that support Access and Interaction

As mentioned in the first part of our paper, we are interested in three technology platforms in support of access and interaction: compressed video, desktop videoconferencing, and a variety of interactive Web-based databases.

Compressed video is a synchronous approach that requires all participants to have access to compressed video equipment. The most effective use is to provide larger amounts of verbal information, obtain

immediate feedback and consensus, and facilitate group exercises. Kick off meetings or initial project prioritizing is typical online usage.

Desktop videoconferencing is a synchronous approach that facilitates actual work activities online. Although this component has real time audio and video its primary purpose is to support sharing and collaborating data and analysis with business software. This Internet access platform can be used one on one or with multi cast server software as many as ten working at a time. The desktop camera and microphone allows for smooth communication as team members share spreadsheets, statistical software, project management software, etc. The most significant benefits include expanding work capacity of work team, efficient movement of team through project completion, effective use of Just in Time interventions, greater reach to remote team members, travel costs can be reduced, accesses best balance of team skills and knowledge, and facilitates effective meeting management (Hoyt and Stockman 1999). You can review the desktop videoconferencing platform in more detail at this url — http://www.Webnetjrl.com/V1No2/WJ_V1No2_Hoyt.pdf

Interactive Web-based databases are used in many ways:

Discussion boards

This is primarily an asynchronous approach that allows an array of postings. These postings are done on an interactive Web-based platform such as Lotus' Domino Server Software (Lotus Notes) with interaction done at any time. Access is facilitated through WWW to a Web site that has linked data bases for discussion. Formatting of the discussion boards can be constructed by setting up categories of each main summary category of the project as a heading with messages, status reports, etc. being posted to the appropriate project category. Category headings posted for an system improvement project would be Defining the System, Baseline for system, Cause Analysis, Improvement implementation, study the improvement change, standardize improvement, and plan for continuous improvement. As the student or work team moves through these problem solving phases each team member can post their work (or work in progress) onto the discussion board and immediately it can be accessed by viewing the information and the interaction can begin on that component (questions by customer, responses by team members, interventions by experts, etc.). This work can be done and posted at any time and interaction can take place at any time, there is not a delay waiting for the next meeting or formal reporting process. More interaction takes place and greater access to project activities improves effectiveness of the work.

Text files

Text can be posted directly onto the message board or attached to a message (similar to email attachments). Project team members can post outlines, interviews, spreadsheet data, analysis graphics, and project schedules. There is not another platform available that can put so much project information in a common location for all project participants to access. A full view of the entire work allocation and project status is available from remote locations and has piggybacking opportunities as more info shared earlier has greater response participation as feedback.

Video and audio files

These video clips can be posted and then viewed using the Real Player plug-in. The clips can be used to facilitate the introduction of new project phases, announce a message to all project team participants, and provide needed reference material for team progress. Individual team members can view video clip at convenient time, post responses or questions, discuss the information together online (in a chat room), and begin application. Perhaps a video clip is posted by the facilitator that reviews the strategy and logistics of constructing an important customer survey. Certain team members may have more responsibility or sole responsibility for this component of the project and would use the clip has a "how to" intervention. The other team members should view the clip now knowing the requirements and better prepared to offer support. A video clip can be maximized by providing an outline (as text posting), referencing Internet links, or establishing a template that can be filled out as individuals view the clip.

Chat functions

This synchronous format in private chat rooms maximizes communication with team members of three or more. This supplemental electronic communication tool provides a forum for live discussion of activities, project status, debriefing of individual interventions with facilitators, issues and barriers. This easy access electronic communication tool can be used to facilitate intra team communication and communication between team members and facilitators. Interactions are logged and can be posted to discussion boards for reference by all team members. Logs can be used for team members that miss chats, or for those team members that were not part of a specific intervention between facilitator and a select team members. The dynamics are unique for problem solving and requires similar level of keyboarding skills to move quickly through a discussion. A chat facilitator is recommended for each work session to keep on task. This tool is excellent for updating task status (in round robin fashion) and generating a volume of ideas from remote team members.

Conclusion

Successes for online applications are arrived at not by implementing technology for technology's sake but because each piece is implemented to fill a specific need or to enhance the way project teams work. Throughout Stockman's career implementing technology, He has found that no matter how interesting a piece of technology, if it doesn't solve a problem or make a process more efficient while being relatively simple to use, it will not be adopted by the "non-techie" masses. Technology cannot be the lead factor for any project, if it is, the project is doomed to fail.

With this is mind, all of the work done at our campus in regard to online applications for training/projects has centered around using only those pieces of technology that one, solve a problem faced in normal delivery of these systems, and two, are very user-friendly. A success cannot come without both of these factors. Think of the Internet itself as an example, although it has always been a powerful medium for information sharing, it really did not blossom until hyperlinks and graphics were introduced making it easy for the technical layperson to use.

Designing these systems with the user in mind, we setout to solve the problems of access and intervention in project work. Because projects are "living" systems that require interactions from multiple participants, and often in differing locations, the Web was the platform on which to solve these problems.

Using the Web helps to solve the access problem, giving each team member the most current information available no matter where they are physically. By placing the projects online we also solve the intervention problem, giving the project administrators access to see the real-time process, then being able to interject with help/direction when necessary.

The Web in itself can be a significant factor to user-friendliness. The Web is so ingrained in our culture now that most people have had some contact with it, knowing how to use its hyperlink architecture. The Web is very low cost to users, only an Internet connection and computer are necessary. The Web is not operating system or browser specific, available to the array of different computer systems. We look to use and build on these advantages to create our systems pushing nearly everything through this consistent medium/interface of the browser.

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Mark Stockman is the Director of Ohio University - Lancaster's Computer Services and responsible for supporting faculty in the design and integration of technology into university classes. His background in education and business as an innovative visionary and skilled practitioner has Mark working on the cutting edge of distance based conferencing platforms.

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Techniques and Strategies for International Group Work: An Online Experience

Diane P. Janes, University of British Columbia, Canada

Abstract

In 1997 a partnership was created between the Monterrey Institute of Technology (ITESM)'s Virtual University and the University of British Columbia (UBC). This partnership resulted in the development of a Certificate in Technology-based Distributed Learning, a series of five graduate courses launched internationally in the fall of 1997. This presentation will explore the international project work and online collaborative experiences of a group of international students registered in a Web-based, graduate-level distance education course offered by UBC and its partner, ITESM.

The first course developed was Designing, Developing and Delivering Technology-based Distributed Learning, which opened in September 1997. This was followed by Selecting and Using Technology for Distributed Learning (winter, 1998), Planning and Managing Technology-based Distributed Learning (fall, 1998), Social Issues in Technology-based Distributed Learning (winter, 1999) and Research and Evaluation Issues in Technology-based Distributed Learning (to be offered September 1999).

Each of the courses in the Certificate in Technology-based Distributed Learning is characterized by set texts, readings, a Web-site of resources, and email and in the case of Selecting and Using Technology for Distributed Learning, a specially designed CD-ROM. In all of the courses, the major strength and central focus, is the emphasis on international collaboration and group work.

This paper and presentation will examine the fourth course in the Certificate program, Social Issues in Technology-based Distributed Learning (Soc.Issues), which was offered to students for the first time in the winter of 1999. Co-taught by two members of Distance Education and Technology, Continuing Studies at UBC (Dr. Mark Bullen and Diane P. Janes, M.Ed.) under the direction of Dr. A.W. (Tony) Bates, the course had an enrolment of 38 students from 7 countries.

Finally, at the end of the term with the formal presentations complete, the students came back together in the larger forum to debrief and discuss their experiences. A final formal paper, submitted by each student, discussed, analyzed and reflected on an issue raised by the course and their experiences within the course.

Techniques, strategies and issues to be explored in this paper include observations on student interaction in an online course including peer moderation of discussions, online participation, language issues, project and time management issues, and collaboration and leadership in international groups.

Techniques and Strategies for International Group Work: An Online Experience

Background

In 1996 the Monterrey Institute of Technology (also known as ITESM, the abbreviation of its Spanish name) began looking for international partners and strategic alliances with other universities. Modeled on MIT, with 27 campuses in Mexico, a number of local centers in other cities and Latin American countries, and a Virtual University component, ITESM sought out UBC for several reasons including its strong link with the Asia Pacific, its attractiveness as an opportunity for faculty and student research and exchange, and its expertise in distance education especially in the area of interactive technologies (Bates, 1999, p. 51).

At the same time, UBC was looking to widen its international activities and ITESM offered strong ties with Mexican and Latin American communities, with many research and exchange possibilities. The result was a strategic partnership in several areas with one of the elements being distance education. On June 21, 1997 the Virtual University of ITESM and the Distance Education and Technology unit of

UBC's Continuing Studies signed an agreement for the development and delivery of five courses in technology-based distributed learning (Bates, 1999, p. 51-52). This became the post graduate Certificate in Technology-based Distributed Learning.

The Program

Consisting of five graduate-level courses, the Certificate in Technology-based Distributed Learning was launched in September 1997 a mere 12 weeks after the signing of the partnership agreement. This was possible for several reasons. First, UBC's Distance Education and Technology unit (DE&T) were very experienced in both the content and subject matter and were able to draw upon in house expertise and creativity. Second, they also had vast experience in the design and delivery of online courses. Finally, although an intense time, as regular work and deadlines all had to maintained, the excitement that was generated by this project and our partners moved mountains.

The first course developed was Designing, Developing and Delivering Technology-based Distributed Learning, which opened in September 1997. This was followed by Selecting and Using Technology for Distributed Learning (Winter, 1998), Planning and Managing Technology-based Distributed Learning (Fall, 1998), Social Issues in Technology-based Distributed Learning (Winter, 1999) and Research and Evaluation Issues in Technology-based Distributed Learning (to be offered September 1999).

For ITESM, all five courses are available to their Master of Educational Technology students, four are available to their Master of Management of Educational Technology, one is available to their Master of Education and four are available to their Education Ph.D. students.

UBC is able to offer these courses a number of ways. Within the Faculty of Education's Master in Education program, students may take the five as electives. A recent agreement with the University of Athabasca, Alberta, allows their Master of Distance Education students to make any or all of the UBC/ITESM courses part of their program. In addition, students can take the courses as single non-credit courses or as part of the post graduate Certificate in Technology-based Distributed Learning. Without a residence requirement, those enrolled in the Certificate must complete and pass assessment on each of the five courses. Audit status is also available with permission, but full fees apply.

All students taking this series of courses from the UBC side of the partnership, whether in the master's program, the certificate program, or taking a single course, follow exactly the same curriculum, take the same assignments and are assessed at the same level.

The Design

Each course in the Certificate program is 13 weeks in length and is equivalent to a three credit graduate course. (This has produced some creative design issues and difficulties in coordinating the ITESM and UBC course start and end dates).

Designed primarily by a team from the UBC side of the partnership, team meetings and decisions were made over videoconferencing and email. The course technologies included:

- Print — textbook and selected readings delivered to students in their package
- A Web Site — comprised of study guide, original teaching materials, online discussion groups, online resources (online articles, journals, access to the extension library), a bookmark database (dynamic due to student input), student and instructor biographies
- Email

On one course (Selection and Use) a specially-designed CD-ROM (Bates, 1999, p. 56)

With course content in English (at ITESM's request, with some Spanish-language tutorial groups formed for the use of ITESM participants), the courses are taught concurrently at both ITESM and UBC. Joint use of the Web Site encourages international collaboration between the ITESM students and those registered with UBC. In addition, some assignments require group collaboration between one Mexican,

one Canadian and one student from a third country. As a team, the group reaches consensus on a topic, usually very applicable to their work or countries, and the result is often rich and interesting.

The core component of each course is the online discussions created in the Web Site forums. When the courses began in 1997, the discussions were handled by software called HyperNews. While very worthwhile in a number of ways, from a technical point of view it required a great deal of support and time. The courses produced in 1999 used WebCT as its software of choice, which included an internal discussion framework as part of its design. In addition to content discussions and an informal international café, where students might take time to socialize outside of the course, the program invited internationally renowned guest visitors to conduct short weeklong discussions with the students. These guest visitors were often the authors of the texts or readings used by the students and gave them a unique perspective on both their writings and on the content covered by the students.

Social Issues in Technology-based Distributed Learning (Soc.Issues)

The fourth course in the Certificate program, Social Issues in Technology-based Distributed Learning (Soc.Issues) was offered to students for the first time in the winter of 1999. Co-taught by two members of the Distance Education and Technology, Continuing Studies design team at UBC (Dr. Mark Bullen and Diane P. Janes, M.Ed.) under the direction of Dr. A.W. (Tony) Bates, the course had an enrolment of 38 students from 7 countries.

The students of Soc.Issues fell into three categories of participation (masters and Ph.D. students, certificate students and audit students). Except for the audit students who participated, as they felt able, the certificate and registered-graduate students engaged in the discussions and collaborative work under the same standards for evaluation. Concurrently ITESM's Virtual University had an enrolment of 100+ students from Mexico, Chile and Venezuela.

Over the 13 weeks of the course, the students engaged in a number of online and interactive activities designed to increase their contact with each other. After preliminary introductions and online posting of personal and professional biographies, the course began formally with the student submission of three short individual analyses of papers.

These short papers discussed the social issues and technology-based learning issues found in the readings that had been either provided in the Book of Readings, provided through online URLs (collected by the course authors) or provided by the student's own research. (If the latter, the student was asked to either supply the URL or a faxed/paper copy to the instructor, of the analyzed work.) The students were provided with three possible frameworks (Boshier, 1996; Gayol, Y. & Schied, 1997; Sullivan, 1983) within which to analyze their reading but were also encouraged to bring other frameworks to the discussion. These short papers were limited to 500 words encouraging the students to be brief and to-the-point. The papers began the thinking process within the course and fueled the next section — the brainstorm.

About halfway through the work on the small papers, the online brainstorming session began. Students were asked to identify the issues they felt needed to be discussed during the course. While the instructors had a reasonable idea of what issues were being debated in the literature, they decided to design the course to allow for full student selection of the core issues. At the end of the brainstorm session, which had a distinct beginning and end, the instructors summarized the discussions into a series of key issues. These issues included:

- The Nature of Education (Topics included the impact on teaching/learning process; dehumanization, deskilling; the impact on purpose; functional/emancipatory issues; and cultural asymmetry)
- Access (Topics included technological access; "psychological" access; learning styles; social access; disparity, gender, class etc.; disparity between developed/developing countries)
- Globalization (Topics included cultural imperialism)
- Whose Interests are Being Served? (Topics included copyright; commodification; militarization; economics)

The course instructors took the key issues and created a framework from which the students could begin the next phase of the course — the online, small group presentation.

Immediately after the brainstorming period, the graduate and certificate students were divided randomly first into 2 groups (A and B) and then into 6 smaller groups within the A or B designation (A1, A2, A3, B1, B2 and B3). Each of the sub-groups (with 5-6 members per group) were assigned the task of deciding on what issue, or part of an issue, raised by the brainstorm and set out by the framework, they wanted to research and present on. In addition, the formal presentation was to be written via consensus in each of the private group forums housed online. The members of each small group were asked to organize themselves with a group-assigned presenter, moderator and summarizer, and to lead a discussion with the main group they belonged to (A or B) on the formal presentation they had written and posted on at the opening of the discussion. Specific criteria were in place for the assignment of tasks within the group and these criteria were used to evaluate the work of the group.

A number of forums were set up within WebCT to facilitate this round of collaboration. First, the groups were made up of Mexican, Canadian and International students, randomly assigned. Second, once created the groups were assigned to "members only space" so that they could plan their presentation in private. Only the tutors had access to all of these private spaces. Third, the students could use any communication model or method to move the group process along: email, real-time chat, asynchronous discussion, fax, telephone, desktop video or in person, if time and place allowed.

Finally, at the end of the term with the formal presentations complete, the students came back together in the larger forum to debrief and discuss their experiences. In setting up the debrief, one of the tutors noted the following instructions:

> *In the Issues thread we'd like you to try to make some final comments that*
>
> *synthesize the various perspectives on a particular issue. By this we mean "the combining of diverse conceptions into a coherent whole or the dialectic combination of thesis and antithesis into a higher stage of truth." It can be the issue that your group focused on or it can be some other issue.*
>
> *In this thread you might also suggest issues that did not get covered that you felt should have.*
>
> *We'd also like you think about and comment on how you think you can affect change. What power do we, as individuals and in our professional capacities, have to influence the way in which technology-based distributed learning unfolds and its social impact? What are our responsibilities as educators with regards to the social impact of technology-based distributed learning?* (Article posted by Instructor Z)

The last assignment, of the Social Issues in Technology-based Distributed Learning course, comprised of a final formal paper, submitted by each student, which discussed, analyzed and reflected on an issue raised by the course and their experiences pertinent to the issue, within the course.

Observations on Student Interaction

In the 13 weeks of this course, the participant-observer instructors concluded that this was an active and interactive experience for most of the students. In the 2,018 posts to the online forums and the approximately 1,400 emails received by the two tutors, it is not unreasonable to conclude that the majority of the 38 enrolled members of this course were engaged and committed to the collaborative process.

Peer Moderation of Discussions

From the outset, each of the six groups dealt with this task in various ways. Many of their choices stemmed from their work or experiences in face to face (f2f) settings. From the beginning, the need to

interact online and via other modes of communication to achieve consensus and arrive at an agreement varied from group to group. The smallest online interaction created a presentation with online moderation and facilitation in just 42 messages. The longest interaction peaked at 230 messages. Both of the last groups to present their work noted a lack of participation no matter what they tried, with acknowledgement by those who participated in the debriefing that they were, by that time in the course, exhausted.

> *I'm a little unsure of how to express what I'm feeling or sensing, so the easiest thing is to just come out with it! Perhaps everyone (our own group, and our peers as well) is tired or a little burned out, or overwhelmed. Or just that they have lives. However, I'm a little disappointed with how our discussion forum is going. It appears as though there may be some difficulty in others "getting" what we're trying to draw out in discussion. Don't get me wrong; there have been a few good contributions. But it feels like pulling teeth to me. Any suggestions?* Article posted by Student K

> *Learning in a constructivist mode is meaningful, but it takes time and hands-on experience to make this possible. I really enjoyed working with members of my small group and the energetic participation. We were disappointed at the low level of involvement in our discussion and we wondered how much could be attributed to being third, spring break, the topic, or the way we posed the question. In any case the best way to learn how to moderate and present is to do it. But feedback is also necessary/helpful from the participants and the instructors.* Article posted by Student Y

Yet even those who went first and who experienced the highest interaction by fellow students, over the three to four week discussion series, expressed some trepidation about going first.

> *I must say that I found it a bit tough to be out there blazing the trail. I now think of a thousand things I may have done differently as moderator to help steer and form the discussion. My tendency was to let people talk and only interrupt if I thought they were getting out of hand. Sorry if I failed you all there.*
>
> *In the end, though, I thought that most people seem to be more polite and stuck to the topic more so than they would have in a f2f discussion. Do you agree?* Article posted by Student F

Throughout the experience, students questioned within the groups their own reactions and choices. With respect to this, a number of students felt they left the process with more questions then they began with…

> *Again, when I think back to the experience that our [smaller] B group had, I wonder how the construction of abstract thinking can be addressed in an on-line medium? How does it differ from FTF approaches? The scenario building approach of our presentation was modeled after the successful, FTF group experience of one of our members. Obviously, this type of exercise requires participants to take some risks and cope with a certain amount of ambiguity. Is this more difficult for students in an on-line learning environment? Are there specific strategies with on-line teaching to facilitate and support the uncertainties of learning?* Article posted by Student X

Online Participation

The online participation in this course varied and depended on where the student was in his or her life at that moment in time. This is perhaps not inconsistent with our experiences in f2f settings but may be suggested that the use of technology to interact and communicate enhances the experiences both good and bad. The idea of 'balancing', 'lurking', yet 'trying to experience all' were some of the themes that emerged in this course.

> *As with the other participants that have posted, I too, enjoyed the interactive nature of this course. Both instructors' input and encouragement to collaborate were paramount to the*

> *course's success–without it, it would have failed, I think. I agree with [student] (above) when she refers to the quantity (and length, for me) of the discussions and presentations–exhausting at times, but very interesting nonetheless. I felt as though I had to play a careful balancing act when coming down to what I should read, research, say, discuss, do on-line vs. off-line, etc. as there are only so many hours in a day, and I, like many others, put in a bursting 'day-at-the-office'.* Article posted by Student A
>
> *I am not sure if some of my colleagues realize that, while there may not have been actual participation in some of their discussions, that didn't mean we weren't "listening" (I believe they call it "lurking" here in the on-line*
>
> *world.). For while some have an easy time writing their responses, it takes others longer. And the longer it takes, the more time one has to reflect about hitting the Cancel button instead of the Post button. (You don't capture "cancels", do you? -- It's the same effect as having hand up in class–but by the time the teacher gets to you, someone has already voiced your thought, but better.)* Article posted by Student F
>
> *...Felt I cheated some of the group discussions. There were so many good topics and things going on, but found it quite exhausting. Sometimes I felt I couldn't keep up. I wanted to focus on ALL of them. (Does anyone else relate to this?)...* Article posted by Student K

Irrespective of the instructor cautions about balancing reading, with online discussions, choosing what conversation to participate in vs. trying to be involved in all discussions, it took some time and experience for some students to settle into a rhythm of involvement. Even then it eluded some.

Language Issues

In one of the earlier posts in the course, a student used an online translator to try and assist with his communication with his Spanish-speaking colleagues. His question to his colleagues after this attempt was as follows:

> *Do you think that this could allow people to feel that they have a greater connectedness with the help of these translation sites?* Article posted by Student G

The response of his colleagues although encouraging the concept and his efforts, noted the software did little to assist in the communication. They noted:

> *Actually the translation is pretty bad. Although I can make some sense of your post is barely understandable, but we (at least I) appreciate the effort.* Article posted by Student D
>
> *I agree with [Student D] in that the translation is pretty bad, but it is the intention that counts. Do you know how to write any Spanish without any help? You may do better. I find that most of the times these official translators usually use very formal language.* Article posted by Student L

Beyond talking about language as a 'societal' issue in the theoretical sense, no other conversations took place online regarding language. This particular thread did continue for several more posts with an intense discussion of issues on the limitations of translator software and of other language and technology issues.

Project and Time Management Issues

For several of the students, especially those who appeared to self-identify as early adopters of technology, time became an issue with respect to the age of the technology they were using.

> *I enjoyed this course although I have to admit that it took its toll in respect to time spent. Much of this alas was dealing with my tired old machine...* Article posted by Student B

The design experience on the part of the authors of the course certainly suggested that group work especially when the membership is kept small, provided many opportunities for interaction and collaboration not found in a larger group format. Even so, students found the work of the small group, while effective, very time consuming.

> *I appreciate the variety of materials you presented to us at the beginning–to start the thinking process. The process of breaking us into smaller groups and having us make presentations and hold discussions was effective–though very time consuming.* Article posted by Student F

It is here that you might like to look at the work of Bartolic-Zlomislic and Bates, who have been conducting a two year study entitled "Developing and Applying a Cost-Benefit Model for Assessing TeleLearning". Their research has resulted in six Canadian case studies and does make the suggestion that

> *...when comparing student estimates of their time spent working on the course to actual course requirements, students generally fell within the desired range of time...While the actual time spent was similar to that spent in a face-to-face course, it* ***seemed*** *to take more work. This is possibly due to the sequential and more intense nature of the discussion forums.* (Bartolic-Zlomislic and Bates, 1999, in press)

> *Looking back at my time log, and in spite of a late start, i spent about 40 hours in discussion between 5 Mar and 19 Mar. Reading was in addition to this.*

> *Because of other commitments, I find it really difficult to get on the list every day, and that's important for continuity of discussion. I appreciate the need for a long discussion period to allow a reasonable number of people to interact a number of times, but it is difficult to visit the list frequently for an extended period.*

> *The flexibility of time online is both a blessing and a curse.* Article posted by Student M

The final comments of Student M certainly sum up the two-sided coin that is technology-based distributed learning.

Collaboration and Leadership in International Groups

The observation of this course and its students with respect to collaboration and leadership within international groups is quite valuable. Overall, the students met the challenges presented by international collaboration without hesitation. Yet, the issues that seemed to be prevalent could be considered issues in f2f collaboration, in some respects. Some of the issues that required addressing included

'disappearance' and 'silence' of team members for long periods of time when decisions were necessary within the group;

the encouragement of some of the more 'quiet' group members by some of the more 'vocal';

the recognition that 'lurking' does not mean lack of engagement with the ideas or the learning

the need to respect the 'time' it takes to collaborate online, to achieve consensus without having met the person or persons you are working with; and

to respect, at all times, the points of view of the group and to create a 'safe' environment for discussion, disagreement and compromise

> *I learned a lot about the collaborative learning process and about the values and opinions of my peers. This certainly has been important for me and dramatically extended my understanding of the complexity of TBDL [technology-based distributed learning] in the real*

world. Article posted by Student T

...Groups. Again, a completely different experience than other ones! It's amazing the juggling that goes on. In a way, I rather liked that we were assigned to groups because it's more true to life. It's very time-consuming to organize groups virtually. Personalities came through which humanized the process for me. Two things were difficult for me. (i) some members didn't make contact for ages, so I even wondered if they were still there; (ii) Sometimes feedback was needed asap and some group members seemed to vanish just then. We resorted to a lot of communication via email as some of us had difficulty with Web and interaction was critical... Article posted by Student K

Conclusions

This course was the first offering of an online course that was very complex in its design. While the course designers and instructors anticipated many of the outcomes, this course was a testament of the dedication and interest of its participants. From all corners of the world and from many and varied backgrounds came a group willing to tackle some of the most current and interesting topics with respect to teaching, learning, technology and society.

Many of the techniques and strategies for international group work come from those who have experienced this phenomena and who come to the challenge from a common sense perspective, a healthy respect for those involved and a willingness to try a new way of interacting.

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Full-Screen Full-Motion Video & Web-Based Learning: Near-Line Solutions in the Pre-Broadband Era

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Abstract

With rapidly increasing use of the Internet for education we are witnessing a major change in distance education. Courseware and delivery are being transformed from off-line to on-line teaching and learning. The digital forms of multimedia for Web-based learning offer more widespread distribution of learning opportunities for students and more efficient teaching by course providers. But something is being left behind in the transition to new media. In the rush to take advantage of the Internet for distributed learning, instructional video is being omitted from the equation. The lack of bandwidth prohibits effective use of video in on-line learning. The mounting of Web-based courses is far outpacing the deployment of the high speed networks that are required for video support. Until there is widespread capacity for video streaming, on-line learning will fall short of the teaching and learning opportunities promised by the new media. This paper describes an intermediate technology solution to the video problem in Web-based learning. Models of hybrid, near-line video streaming are proposed.

Full-Screen Full-Motion Video & Web-Based Learning: Near-Line Solutions in the Pre-Broadband Era

The Rise and Fall of Educational Television

Distance education since the 1970's has been defined largely by television. The great equalizer for educational opportunity was to broadcast instruction. In 1969, the British Open University defined distance education when in partnership with the BBC, it made enrolment in university possible for all who had a television. Televised courses quickly became recognized as the best means to deliver instruction to those who could not attend classes. Americans popularized the telecourse format in the 1980s. The typical telecourse consisted of twenty-six half-hour television programs packaged with textbook, study guide, student and faculty manuals. North American telecourses were delivered in 13 week broadcast schedules that catered to the college tri-semester system. Add to this mix, audiotapes, the postal system and the telephone and we have distance education as the original television-based multimedia learning experience.

There has always been more to distance education, however, than mere television. Best practices in distance education employ an integration of media formats, content presentation, delivery systems, and personal interactions. Educational technologies, qua *process* and *hardware*, are selected, manipulated and applied to the greatest effect for the organization of material, its distribution, and for teaching and learning interactions. In the latter half of the 1990s we have seen the role of television change from key pedagogical component of the learning system to lesser roles such as helping pace students in their independent study and promoting the institution with a public television image. The instructional role of ETV was replaced by videotaped programs, recorded off-air by students or borrowed from the library for later use. The importance of video varied from course to course, but unlike television, portable archived recordings (videotape) provided far more flexibility to meet the needs of the distance learner than what could be offered by television on a fixed broadcast schedule.

ETV proliferated in Canada during the final three decades of the twentieth century. Télé-université Quebec, TV Ontario, ACCESS Alberta, and British Columbia's Knowledge Network, were all established primarily for the support of distance learning through television broadcasting. But now, at the close of the century, we are rapidly moving from an analog to a digital era where *new media* has become the rubric for all manner of communication that is not face-to-face. New media may be defined as information that is data, organized and displayed in a variety of text, audio, and graphic forms, with static and moving images, all integrated and accessible from one machine — the computer. On the eve of the millenium, we look behind us and we see the rise and fall of educational television as we have come to know it. This paper is concerned with the analog to digital evolution in education and focuses

on video in the new multimedia mix in distributed teaching and learning.

New Media

In its *1999 State of the Internet* report, the United States Internet Commission described the growth of the Internet compared to other communications technologies of the past:

> It took 38 years for the telephone to penetrate 30% of U.S. households. Television took 17 years to reach that level of availability. Personal computers took 13 years. Once the Internet became available to households with the advent of the World Wide Web, it took less than seven years to reach the 30% penetration level. (p. 3. See Table 1).

The evolution of the Internet as a ubiquitous, universal, inexpensive, and easy to use telecommunications technology has taken the out-of-classroom experience to new levels. Combine this communications network with computer-based materials and access and we have a fully digital environment for distance education: a community of teaching and learning that is defined by the new media. Much is different in the new media society: new technologies, new applications, new ways of creating and presenting learning materials; new ways for learners to interact with their teachers and fellow students; new knowledge and skill sets required of instructional developers; and most definitely, a whole new language to learn. (See www.techguide.com).

Distance education or open learning may now be called distributed teaching and learning (from host to client and client to client), or Web-based learning, or on-line learning. On-line implies computer-mediated communications (CMC), the virtual classroom, or virtual university where the student may never see or speak with a "live" person from admissions and registration to receiving instruction and final grades. Pure on-line learning raises lots of questions. A recent TeleLearning study commissioned by Industry Canada, focused on a sample of key providers of on-line post-secondary education. The ensuing competitive analysis report reveals a cross-section of approaches to planning, resource allocation, and market share in the new on-line education industry. (Massey and Curry, 1999). Recurring issues revolving around concerns about access that have been the focus of attention for distance educators are beginning to attract growing interest in research into on-line learning. (Fahy & Archer, 1999).

What is off-line learning? This question returns us to the more common, current practices in distance education where there is still a mix of analog & digital technologies. Some institutions offer home study courses where the student has the choice of enrolling in the on-line or the off-line version of the course. (Fahy & Archer, 1999, 16). Accessibility is still a key determinant for program development and enrolment. Only fifty percent of Canadian homes have access to the Internet. (Bélanger, 1999). Demographic, socioeconomic and cultural characteristics remain the chief factors in determining the mix of media and methods employed by distance educators. Most institutions are still combining a variety of methods to teach students at a distance. The mix will usually include both on-line and off-line practices. Examples include viewing videotapes, at home, telephone tutoring, sending assignments and returning marks in the mail, audiographics, videoconferencing, email, chat rooms, and so on.

The new media paradigm beckons. As we approach … or perhaps, as we *race* toward the next millennium, we find ourselves caught up in a digital imperative. Distance educators are abandoning telecourses in favour of Web-based courses. Publishers are offering Web sites and Web course templates at no cost to professors who select their textbooks. Many colleges and universities require their students to have computers and IP accounts as a condition of enrolment. More and more employers are demanding IT literacy of graduates entering the workforce. Governments are frantically developing enabling policies and making large grants available to promote connectivity and knowledge-based economies (KBE) as strategies for gaining position in the global marketplace. Traditional marketing & transactions for goods and services are moving to Webcasting and e-commerce.

In sum, government, business and industry, and consumers alike, are pushing towards the new media society. By the end of the 1999 school term, Canada had become the first country in the world to have all classrooms connected to the Internet. (Hull, 1999). By 2001 all Canadian homes will be connected,

and by 2002, most delivery to Canadian schools will be on-line. (Bélanger, 1999). The British Columbia Ministry of Education is one example of a jurisdiction that is implementing a plan to establish a complete set of on-line services for resourcing schools: from downloading *Instructional Resource Packages*, to e-commerce transactions at the virtual warehouse, to streaming video (when bandwidth permits).

When Bandwidth Permits

The new media society is defining a new type of conspicuous consumption, where instant gratification is measured in clicks. The fundamental macro issue for distance education will always be access to educational opportunities, but the issues for new media delivery are at the more micro level of interactivity. As suggested above, universal access is more or less in hand. Our expectations are now best described by the term, "on demand". Information and communications technologies (ICT) put us in a constant state of readiness. Learning on demand means that I can log on to my course at home, at work, in my hotel room, at a friend or relative's house, in the hospital, or at the country cottage, at any time of the day or night. Web course designers also want to create opportunities for students to access information in the easiest ways possible while they are on-line. Information on-screen should be presented in ways that are immediately accessible with a minimum number of mouse clicks. We want the student to focus on the information, the learning objects, not on the technology, on distracting or cumbersome procedures such as moving between files, waiting for lengthy downloads or audiovisual synchronicity. Instructional developers have found that students want to be engaged with learning, they want cognitive and behavioural interaction. (Washburn, 1998). Further, Web courses generate higher enrolments than traditional, analog distance programs. The Internet knows no borders. Troubleshooting in a group of 1,000 distributed students presents far more serious management problems than in a traditional distance class of 100. Therefore, we need to keep Web-based courses simple: not too many clicks with an optimum quantity and arrangement of screen text, graphics, and waiting time.

The Internet is technologically challenged. The demand for high quality media rich content delivered synchronously or asynchronously on the Web, exceeds network capacity to supply. One of the greatest pressures on the Internet today is bandwidth. In February 1999 there were 12,500 courses available on-line in Canada. (Telecampus, 1999). It is ironic that in the post-industrial developed world we have been plagued by a sort of tautology where technologies are usually far more advanced than are our abilities to use them, yet today, new ITC technologies such as the Internet, are technologically limited. Far more could be done were we not restricted to transmission speeds of 28.8Kbps - 56Kbps. We are approaching a bottleneck in connectivity.

Deregulation in the North American telecommunications industry has helped create the conditions for telephone and cablevision companies to be competitors in the same markets. Telcos and cablecos are rapidly laying fibre for the deployment of high speed, high capacity networks. Canadians have been told that by 2003 they will all have broadband services to their homes. (Bjerring, 1998). This level of service means streaming video on-demand at the quality of high definition television (HDTV) Such clarity of images will be superior to anything we are currently seeing in our homes or classrooms (DVD programs excepted. DVDs (digital versatile disks) have been entirely a consumer entertainment medium for the feature film industry, though very recently, DVD production has begun to occur for education and training applications.). This level of connectivity will bring all of the best qualities of film and video to the new media mix, and in addition, full interactivity. But what do Web course designers do until then? Distance education methodology has always been in a continuing state of change, utilizing available technologies until new ones become available. Innovative thinking leads to creative solutions, and there are currently, intermediate technologies that can address the new media educator's needs for bandwidth. One example might be called hybrid video streaming, a way of navigating successfully through the bandwidth bottleneck.

There is a dearth of video in today's Web courses, and where video is used, it is applied rather ineffectively. Images are typically small thumbnail sketches; they are jerky and fuzzy; they are slow to display and download; the files are too large to store locally. When bandwidth permits, none of these problems need exist, but in the meantime, the troublesome aspects of using video on-line have relegated this powerful instructional medium to the backbench in the educational tool shop. This unfortunate

hiatus is leaving a wealth of instructional resources out of distributed teaching and learning. The quality of on-line instruction is the poorer for it.

MPEG Video

MPEG is the international standard for digital video. (See *Digital Video for the Next Millennium* http://sunsite.utk.edu/video/). MPEG1 has been universally accepted as the standard digital file format for on-line video streaming. (Mappin & Trautman, 1998). The essential characteristics of MPEG files are that they permit full motion viewing (30 frames per second); they are scaleable so that sound & image quality will be retained at different data rates (these rates will vary in relation to available bandwidth); and MPEG video is platform-independent. (Ryan, 1997). Readily available hardware and software, for example, current Windows or MAC operating systems, can display MPEG1 files. Minimum bandwidth required for streaming is T1, or 1.5 Mbps. MPEG1 video quality resembles that of VHS videotape. (See Zahn, Slimp, Jones et al, 1999).

Digital video file types that are in common use off-line in multimedia CD-ROM, or found on the Internet, are not MPEG files. The formats used, while simple and inexpensive to create, do not lend themselves well to interactivity. Because of the relatively poor quality of these video images, and because until recently, the cost of MPEG encoding has been prohibitive, digital video has been used rather sparingly. This need no longer be the case. Commercial MPEG transfer labs and reasonably priced encoding systems have now made MPEG video accessible for use in on-line learning.

In the age of the information highway we have come to a fork in the road and the way is now being paved for us to readdress the applications of instructional video. However, before discussing the re-application, and indeed, the new applications of video in distance education, one more piece of the digital puzzle must be recognized, namely, intellectual property rights. As with course development in the analog formats, rights must be acquired for digital use of content. Digital rights licensing, especially for video, is a very new phenomenon, and given the incipient nature of digital media, many producers and their agents are ill prepared for the conversion and distribution of their intellectual property in this new marketplace. The drafting of new copyright legislation and the emergence of producer collectives are facilitating content provision for new media. More and more digital resources are becoming available to populate our servers.

Let's turn now to the hybrid solution of streaming full-screen, full-motion (FSFM) video in Web-based courses. At the time of writing, bandwidth limitations restrict FSFM video streaming to Intranet or LAN and WAN environments. Until broadband networks become generally available we cannot expect to see many media servers populated by MPEG video files. Instead, consider video stored and distributed on CD hard copy. One hour of MPEG1 video can be stored on a CD at the standard data rate of 1.5Mbps. Distribution of CDs to students is analogous to library sets of videotapes. CDs of partial or entire Web course content are finding their way to students To enhance access and to make hard copy options available to learners some distance education providers have begun to press their Web courses to CD for distribution in course packages.(See http://orderdesk.openschool.bc.ca/OMA/).Costs are decreasing for compression, CD burning, replication and distribution. Unlike programs on videotape, however, video information on CD is immediately accessible; it is searchable, and clips can be easily bookmarked for integration with other courseware components. In a word, digital video has interactive properties that are simply unavailable in analog video. When students click on a hot link while on-line with their Web course, they are immediately transferred near-line to the MPEG file resident in the CD-ROM drive. The video plays on the monitor where it can be easily sized by the student.

Interactive Video

What really separates analog from digital video is interactivity. Segments within video programs can be selected and indexed for speedy and accurate search and retrieval. Video clips can be indexed in any order with user-defined keywords, concepts and descriptions. The indexes can be modified at any time and saved as small text files. This "editing" of video programs is virtual: the program is not actually edited or cut. Sound is not separated from image. Pointers or bookmarks simply locate sections in the program. Copyright of intellectual property is protected.

This functionality with digital video represents a significant paradigm shift for educational televisual programming. Traditional viewing behaviour would have the learners watch the entire program, or they would be directed to sections referenced by running time on the videotape. The student might be directed to seek information from the program, synthesize the information and report on it in a text-based assignment. With digital video the student can access pre-established clips and can demonstrate learning by reporting back to the instructor in kind: the learner creates an arrangement of clips, complete with his or her own indexing and on-screen text. This information is saved as a small meta-data text file that can be sent to the instructor as an email attachment. On opening this file with the MPEG program, the instructor views and assesses the student's video exercise. In this representation, video is transformed from a comparatively passive, one way medium to an active learning tool. Video has now become a very powerful courseware component.

VideoBase™

VideoBase™ is a proprietary software interface that provides functionality to video in new media environments. (See www.sonoptic.com). This interface uses the metaphor of a book to order and classify video objects for instructional purposes. A three-tier information-retrieval scheme organizes the video program into Chapters, Sections and Indexes. These tiers are accessible through a Table of Contents. (Fig. 1).

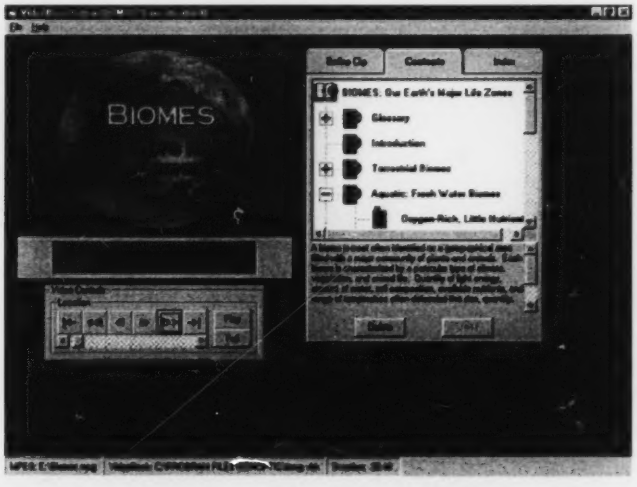

FIGURE 1. VideoBase™ Table of Contents screen showing Chapters and Sections

The VideoBase™ meta-data structure allows the user to create in and out points for clips, titling and screen notes, and indexing with custom classification. (Fig. 2). Screen sizes can be altered and filters can be employed for rapid search and play.

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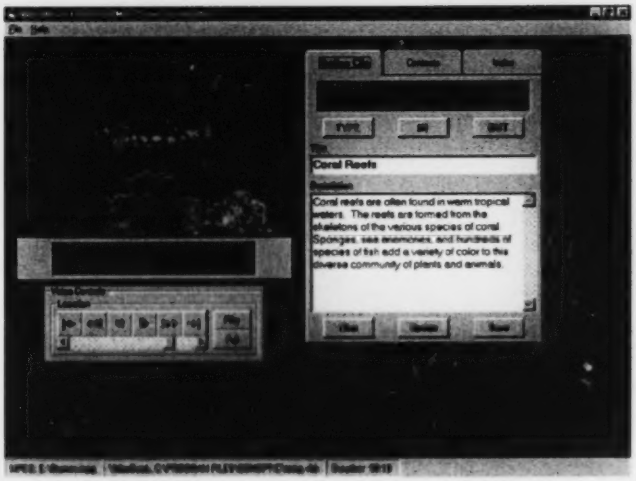

FIGURE 2. VideoBase™ clip creation screen

VideoBase™ reads the MPEG video program that is stored on a local hard drive or a CD. After the user creates the clips, he or she saves the work as a *videobook* file. At any time when this file is opened, modifications can be made to the *videobook*. If the instructor chooses to exercise control over the file, the learner may be limited to creating simpler sets of clips called *playlists* within a *videobook* file. A *playlist* file of clips can then be submitted as an assignment.

VideoBase™ illustrates a new level of interactivity in education. This tool is unique in that it recognizes the importance of video in teaching and learning. It provides both a rationale and a means of bringing high quality video resources to the distance education enterprise. And as a device for deconstructing and reconstructing knowledge, it is a powerful tool for media literacy. Perhaps of greatest importance for producers, is that VideoBase™ helps protect intellectual property rights. Clips cannot be created without first making the entire program available for viewing. Only after this first complete clip is established, can chapters, sections and indexes be created to form a *videobook* file. The complete program is always available to be played in its entirety, just as the producer created it. His video assets are protected.

Summary

Opportunities and issues in distance education are determined by access and interaction. Historically, the use of television in distance education has been characterized by the mass media practice of broadcasting content from one to the many. Later, the introduction of the videocassette gave students the flexibility to learn at their own pace. New technologies and their applications have expanded access to learning opportunities and have increased the opportunities for and the quality of teacher, student and peer interactions. As traditional television producers and broadcasters struggle to find interactivity, today's instructional designers are creating flexible and customizable, resource-rich programs that promote active learning. The new media, best represented by the Internet and digital IT, offer the most radical improvements ever in accessibility to education. As we move through the transition from analog to digital media, the utilization of video will undergo a special transformation of hybrid applications until broadband networks connect all teachers and students.

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Student Motivation and Distance Education on the Web: Love at First Sight?

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Abstract

The goal of the present research is to study and better understand the motivational impact of the implementation of two courses held on the Web. Our starting hypothesis was that these courses, as their nature promotes self-determination (Deci and Ryan, 1991), would have a positive impact on the motivation of the students and on their learning.

While the analysis of the results reveal the positive impact of a course given on the Web on the students' motivation to learn, the analyses conducted also unveil the fact that all students may not be ready to handle such autonomy or self-determination, and that the gap between the university classroom and the virtual classroom is substantial, often difficult to bridge. This gap is particularly evident when we observe the significant decrease in the students' motivation after only four weeks of the course. Many years ago, Gutenberg redefined access to knowledge through the arrival of printing. In the same vein, today's society has been given the opportunity to leap forward (Laferrière, 1997). The integration of new information and communications technology in university teaching presents an enormous challenge and the disruptions inevitably entailed must be faced with both dynamism and caution. For instance, Marton (in press) highlights that "virtual" courses on the Web are often created without sound pedagogical basis. Unfortunately, many resort to such pedagogical innovations because of their newness and the societal interest they generate, without putting forward any learning objectives. There is definitely a need for attractive Web-based courses at the university level that are both motivating and instructive, but care must be taken not to allow the fireworks of technological teaching environments to take away from the course content. As noted by the Conseil de la science et de la technologie (1998), sciences and technology are the engines of innovation and are at the heart of the economic growth of modern societies: they are destined to increasingly gain in stature at the core of any citizen's basic training.

Student Motivation and Distance Education on the Web: Love at First Sight?

Introduction

At the doorstep of the next millennium, university education faces numerous challenges: the growing diversity of student profiles, the arrival of new technologies, the multiplicity of university programs, as well as the students' lack of motivation. According to Gadbois (1989), "*Of all things that ail society [...] the most important is the lack of interest for any activity that doesn't offer short-term personal profit. This attitude is manifested by a great number of young people in their lack of motivation for schooling and for their no-preparation for an eventual social role.*" (Gadbois, 1989: 32)

Our changing society, now more and more centered upon information and communications technologies (ICTs), is giving rise to new educational needs as well as to new teaching methods (Basque and Rocheleau, 1996). Distance education, in particular the arrival of courses held on the Internet, appears presently to be one of the great focuses of pedagogical innovation at the university level. Furthermore, as these types of distance courses greatly augment the possibilities of network implementation and of individual or group learning, the most basic teaching theories and principles such as those of Thorndike (law of effect and law of exercise), of Dewey (learning through action), of Piaget (construction of knowledge) and of Vygotsky (learning as a socio-interactive process) can be applied more readily and especially more often (see Grégoire, Bracewell and Laferrière, 1996). Aware of the challenges issued from university teaching, particularly those pertaining to the students' motivation to learn and to the development of richer technological environments, it was decided to implement, at the University of Quebec in Hull (UQAH), a distance education course, based on the Web, in the teacher training program. It should be noted that UQAH is a medium-size university, and has never housed such an

experiment in the past.

Goal

The goal of the present research is to study and better understand the motivational impact of the implementation of three courses held on the Web. Our starting hypothesis was that these courses, as their nature promotes self-determination (Deci and Ryan, 1991), would have a positive impact on the motivation of the students and on their learning.

Theoretical Framework

Motivation and the Integration of ICTs to University Pedagogy: the Case of Web Courses

Motivation, a force that energizes and directs behavior toward a goal (Eggen & Kauchak, 1994), could certainly be perceived as one of the most important psychological concepts in education. In fact, according to Meece (1993), current educational problems go beyond declining achievement scores: most schools today face a crisis in student motivation. Student motivation is critical for learning, and several researchers have found a positive and robust correlation between motivation and achievement to prove it (Urugoglu & Walberg, 1979; Vallerand & Senecal, 1993).

Since the beginning of the twentieth century, the concept of motivation has been studied according to a variety of perspectives (Overton, 1984; Weiner, 1992). In the last thirty years, many models, approaches and theories have inspired researchers studying motivation and education. According to Pintrich and Schunk (1996), many are the result of modern conceptions of human beings and of the way in which they learn. In addition, three important educational schools of thought seem to guide modern theories of motivation: behaviorism, cognitivism, and humanism. Among these approaches, Deci and Ryan's motivation theory (1985, 1991) stands out.

Motivation according to Deci and Ryan (1985, 1991)

Deci and Ryan's motivation theory seems more complete than others as, on the one hand, it emphasizes the dynamic relationship between the individual and his environment and, on the other hand, it is very relevant for educational research (Vallerand, Blais, Brière and Pelletier, 1989). According to the theory of cognitive evaluation (Deci and Ryan, 1991), an individual's motivation is mainly determined by his needs for self-determination and competence. The authors emphasize that there also exists in individuals an important need for affiliation and that this need complements that for autonomy, and is also necessary for the development of self-determined motivation. In fact, according to Deci and Ryan, everything which is likely to influence these three factors, that is to say the feelings of self-determination, competence and affiliation, would thus have an impact on student motivation.

Feeling of Self-determination: the Determining Principle of Motivation

In reality, feelings of self-determination correspond to individuals' perception of the origin of theirs action. If a person believes that they have chosen their behavior, his feelings of self-determination will be heightened. The context in which the task is achieved is then perceived as promoting autonomy. Conversely, if an individual believes that his behavior is a result of external induction, his feelings of self-determination are weakened and the context in which the task was accomplished will be perceived as controlling. A stronger feeling of self-determination will have a positive impact on the development of a student's academic motivation, whereas the opposite will have a negative impact.

Feeling of Competence: Second Determining Principle of Motivation

According to Deci and Ryan (1985, 1991), the second determining principle of motivation is the perception or feeling of competence. This element may be defined as a complex affective state, which is relatively stable, lasting and linked to an individual's representation of his aptitude, of his competence in regards to a given activity. Events which help an individual to feel competent increase his

self-determined motivation. On the contrary, events which undermine an individual's feelings of competence decrease his self-determined motivation. Many contextual factors can affect students' perception of competence and consequently, their academic motivation "curriculum, class structure and the teacher represent the sources of influence which may influence motivation." (Vallerand, 1993; p.267)

Justification for and context of experimentation

In the theoretical perspective of Deci and Ryan (1991), it seems that a student's academic motivation is modulated by his feelings of self-determination, competence and affiliation, and that what influences these three factors may also have an impact on motivation. But what of the influence of the pedagogical approach used at university and the learning environment offered to students? Are feelings of self-determination, competence and affiliation promoted? Can we really blame university students for being unmotivated by a learning environment and teaching methods which have failed to profit from the newfound enthusiasm created by social changes and the arrival of new information technology? Can we blame them for not having taken the traditional academic route in their relationship to knowledge, a route which is not the way of the future? Is the integration of new information technology as a teaching method and as a learning environment likely to sustain the development of greater student academic motivation?

In order to answer these questions, an experimental Web class was designed and put forth at the UQAH. This was a first at the university, and the context for a study of the impact of a Web course on student academic motivation seemed favorable.

Creating a Web Course at the UQAH: Between class notes and Liberace

We developed the Web-based *Introduction to Educational Research* course, drawing inspiration from a number of recommendations made by Boshier, Mohapi, Moulton, Qayyum, Sadownik and Wilson (1997) in their study of Web courses. This was an extensive study on the quality of Web classes, analyzing a total of 127 courses according to an encoded grid encompassing 43 criteria. In their conclusion, the authors clearly state that not all Web classes gain the interest of students. The results of their research suggests that, among other things, there exists incredibly boring classes which are nothing more than class notes posted on the Web. On the other hand, there are also classes which are overloaded with hyperlinks, animation, flourishes, artifice and enchanting decor which would impress Liberace himself. Moreover, they point out that "virtual" courses are often created without any pedagogical basis. Unfortunately, for the most part, universities resort to Web classes for their modern edge, for something new rather than for specific educational objectives (Marton, 1999). At the UQAH, we needed to develop a course which would be both captivating and motivating, without overwhelming the message (content) with the medium (McLuhan, 1972).

Summary description of the virtual course created at the UQAH

In addition to the importance of promoting student motivation, it was essential that the Web course designed at the UQAH be well structured, that there be a logical and coherent presentation and that a technical information page be available and easy to find (software to download for easy navigation in the Web course). Furthermore, we felt it important to include softwares which would allow students to communicate on the Internet in a chat room, through an electronic bulletin board, or by email, and a feedback page to allow students to ask for help on-line. Finally, the integration of strategic teaching principles to the class was deemed essential, in order to allow students to acquire better, autonomous, organized and structured learning methods. For Tardif (1996), this rigorous pedagogy, aimed at integrating new information technology to education, is essential for greater learning.

Method

Subjects

Three groups of 36, 48 and 52 university students (85 females and 51 males), in their second year of a four-year teaching program and enrolled in the Web-based course were selected to participate. They had

a mean age of 20 years old.

Quantitative measures and analyses

An adapted version of a motivation scale developed and validated in Canada, the Motivation in Education Scale by Vallerand, Blais, Brière and Pelletier (1989), was administered three times to all students who were participating in the project. The results of the analyses conducted indicate that the internal consistency of all subscales of this scale is excellent , ranging from .80 to .92. With respect to validity, the present results are also very encouraging. A factor analysis highlights the five-factor structure and thus provides some support for the factorial validity of the scale. The first measure of motivation took place at the beginning of the first class, before the students were told that this course was to be given on the Internet. The second measure was taken after the third week of the course, when students were fully informed of the particular nature of their learning environment. The third measure was taken in the twelfth week of the course.

Qualitative measures and analyses

Drawn not only from the results of the motivation tests and from interviews conducted with students, results are also a product of the analysis of electronic mail received (n > 850) and transcripts of conversations held in "chat" (synchronous) mode. It appears important to mention here that the qualitative analysis of such data would seem to be an increasingly promising means for dealing with qualitative data in education, especially in light of the teaching methods and the learning environment offered to the students taking "virtual" courses held on the Internet (Winiecki, 1999).

The analysis of the qualitative data was conducted using an approach greatly inspired by those of L'Écuyer (1990), Sedlack and Stanley (1992) and Huberman and Miles (1991, 1994). We have adopted a content-analysis type of approach. According to Sedlack and Stanley (1992) and L'Écuyer (1990), analysis of content is a "method of classification or codification of different elements of the given material, allowing the user better to know its characteristics and signification" (L'Écuyer 1990; p.9) As can be seen in Table 1, this author proposes a six-step model for the analysis of content, and it is to this table in particular that we referred in our analysis of the data collected.

Step	Characteristics
I	Reading of the data collected (transcripts of interviews, emails received, transcripts of conversations held in CHAT mode)
II	Definition of classification categories for data collected
III	Process of categorization of the data collected or final classification of the data collected (according to the three determinants of motivation)
IV	Quantification and statistical data processing (not presented in this text)
V	Scientific description of the case or cases under investigation (course developed at UQAH)
VI	Interpretation of the results outlined in Step V (in this step, L'Écuyer (1990: 23) speaks of "discovering the hidden meaning, the latent content" of the data collected)

Table 1: General Model of the Different Steps in Content Analysis (adapted from L'Écuyer, 1990)

Presentation and Analysis of Results

Quantitative measures

The results obtained by the students enrolled in the Web-based course, in the first motivation test, are relatively equivalent to those of other university students enrolled in "regular in-class courses" at the beginning of the semester (Figure 1).

(Figure not available - contact the author)

Figure 1: Self-determined Motivation of Students enrolled in Web-based Courses Compared to Self-determined Motivation of Students enrolled in "regular in-class courses".

The students' average score for the second motivation test, at a time when they were completely aware of the organization of the Web-based course, is significantly lower than the average score obtained in the first test ($p < 0,0001$), as shown in Figure 2. This result is evident and more or less equivalent for the three classes (Figure 3).

(Figure not available - contact the author)

Figure 2: Representation of Students' Average Self-determined Motivation Score in Week 1 and Week 3.

(Figure not available - contact the author)

Figure 3: Representation of Students' Average Self-determined Motivation Score in Week 1 and Week 3.

The average score obtained by the students in the third motivation test, administered in the twelfth week of the course, is significantly higher than the average score in the first($p < 0,0001$) and second tests ($p < 0,0001$). This fluctuation is illustrated in Figure 4.

(Figure not available - contact the author)

Figure 4: Representation of Students' Average Self-determined Motivation Score in Week 1, 3 and 12.

The students' results on the motivation tests seem to highlight the resistance felt and hardships encountered at the beginning of the implementation of the course held on the Web. Nonetheless, these results also show that the motivation of students at the end of the course was much higher than when the course first began or in the second week when a certain effort was required simply to get adjusted to this new kind of "Web-based university teaching".

Qualitative measures

The results of the students in the three motivation tests were corroborated by the qualitative analyses. The analysis of the interviews conducted with the students, the transcripts of conversations held in CHAT mode and the emails received also highlight the way in which a Web-based course promoted the students' feelings of self-determination, competence and affiliation. It is therefore in reference to these three determinants that the results are presented.

How the Course Promotes Self-determination

Many researchers, such as Relan (1992), have shown that using virtual learning environments can be a determining factor in promoting feelings of self-determination. Analysis of the data from this study demonstrates the many ways in which the UQAH Web course impacted this determinant of student motivation. Among other things, such a learning environment seems to have allowed students to:

- work at their own pace
- structure and manage their knowledge acquisition
- choose their workplace
- be active in their learning by making their own choices

A Permanently Accessible Classroom

The comment which is most often found in the data is that the classroom (the class Web site) is

accessible at all times and from anywhere. It is among the elements which seem to have been most appreciated by students. Many underscore the advantage of such accessibility and indicate that the flexibility of the learning context helped them regain the desire to attend university.

> *"A class like this has allowed me to appreciate university anew. I work part-time [...], but I've always given priority to my studies [...] This class gave me a lot of flexibility"* (interview excerpt; student)

> *"Sir [...] I'm writing to tell you how much I appreciate the Internet class. Having access to the classroom 24 hours a day is a great advantage for me. I find it really modern and it really motivates me to apply myself in my work [...]"* (student email excerpt)

> "*For me, the greatest advantage of the Internet class is that I can do my assignments when and where I want [...] I'm no longer constrained to the class schedule or the classroom. If I feel like going to class on the weekend, I go [...]* "(interview excerpt, student)

Long Distance Education: When Access to Class Is No Longer Restricted by Geography

For many students living in outlying regions, this class has allowed for greater autonomy, which in turn promoted an increase in the time spent on study. Students no longer had to travel to get to class as the latter was accessible from any location.

> *"This class also allowed me to give more time to my studies. Driving from Papineauville to Hull (about 75 km) takes up two hours a day. With this introduction to research class, I could be at school and at home at once. "*(interview excerpt; student)

> *"[...] usually, I live with my aunt during the week and I go back home to Mont-Laurier on the weekend [about 300km from UQAH] . When we go on internship, mine is in Mont-Laurier, so it's more complicated because I travel a lot more between Hull and Mont-Laurier . With this class, I don't have to be in Hull or Mont-Laurier. No matter where I am, I can do my homework and follow the class. It's very handy for me, it lets me independent and I waste less time [...] That way, I spend more time on schoolwork. "*(interview excerpt; student)

> *"Hello Sir, I'm sorry there were no accents in my work [the email was originally written in French which requires some accents such as é, à, ê]. I can't find them as I am writing to you from the United States on my father's computer. I think it's fantastic to be able to attend class while I vacation here [...] "*(student email excerpt)

Conversation Excerpt in Chat mode (synchronous mode)

> Student 1: [...] *It's actually the first time I can attend class from home in Montreal. It's fabulous.*
>
> Professor: *It's one of the advantages of a virtual course. Class can happen anywhere.*
>
> Student 2: Lucky you. I'm still at University. I had other work to [...]
>
> Student 3*: It's true that it's convenient. No need to worry about taking the bus, going somewhere else. It leaves more time to do the work.*
>
> Professor: *Exactly... the purpose of this meeting is to [...]*

Learning at One's Pace: Reinforcing Feelings of Self-determination

This course seems to contribute to the development of students' feelings of self-determination, as they are neither hurried by faster students nor slowed down by slower students. They can thus progress at their own rate, independently, within exercises and activities which promote learning. This fact is

particularly important when this type of course is compared with traditional courses given in classrooms. Thus, for example, students who are ahead can finish the course within a few days, while others can finish it more slowly, according to their ability to meet the objectives.

The individualized pace afforded by a virtual course reveals an important motivational factor and seems to be perceived as an advantage by all the students.

> *"Hello, it's the end of the class and you wanted some comments [...]. Here are mine [...] In general, I really enjoyed the course. There was a lot of work, that's true. But, for the first time in a while, I was really able to learn at my own pace. This was the most positive aspect of the class for me. In regular classes, I drift off a lot. Sometimes, it's because I don't understand and the prof goes too fast, other times it's because I'm bored and the prof asks too many easy questions. With an Internet course, I could go at my own pace, and for me, this was a great source of motivation [...].* "(Student email excerpt)

> *"The idea of being able to go at your own pace, I think it's great. In the past, I've dropped out of university classes because the prof went too fast. At the beginning of each course, the very first class, that's what I'm afraid of. If it's going too fast and I don't know anyone, I immediately feel like dropping out. With the Internet course, I worked a lot, but I never felt hurried. I could take my time [...] the time I need to do the work [...]" (interview excerpt; student)*

Conversation Excerpt in Chat mode

> Student 4: *We can do the work when we want?*
>
> Professor: *Yes, as long as you hand it in before the deadline.*
>
> Student 4: *Does that mean I can finish the class in 4 weeks if I want?*
>
> Professor: *If you meet all the course requirements, yes.*
>
> Student 5: *That's good. Has anyone ever finished one of your classes in one week?*
>
> Professor: *This is the first Web class at the UQAH, so it's hard to answer.*
>
> Student 5: *Well, that motivates me to try it with my team. We'll send you our work...*

Self-Management of Learning and Knowledge: a Pedagogical Environment that Opens the Door to Autonomy and Active Participation

The design of the virtual course is centered on the development of students' feelings of self-determination (Deci and Ryan, 1991), both from the standpoint of deadlines and of personal investments required from students. Indeed, once on the course site, the student plans his learning process by using the class calendar. Globally, this calendar allows him to fix goals and deadlines of his own while adjusting the pace at which he works. Conversely, a student in a traditional course–in a classroom–has the same constraints and deadlines as his colleagues imposed upon him, leaving little room for autonomy. However, the nature of the course does not promote autonomy unilaterally: the learning method proposed to students requires self-determination and self-management, all while emphasizing the development of the student's sense of competence.

Nevertheless, for a few students, the autonomy granted them at the beginning of the course seemed difficult to manage, particularly during the first few weeks where they thought that in the absence of a strict framework, regular class schedule and actual classroom where one must be prescnt weekly, that "*the work can be done at the last minute*" (student). Some students then stated that they were not "*used to learning by themselves* " (student) or that they may not have been ready to work in a class where "*you have to be the one to discipline a student (me) who doesn't work [...]* " (student) or that the fact they had

"*so much autonomy, all at once, demands a lot of discipline, and at first, I wasn't ready* " (student).

However, even if many students weren't used to managing their own knowledge acquisition, many indicated that this was one of the course's positive aspects. Others even stated that having more responsibility pushed them to work harder and participate actively and that it allowed them "*to learn how to learn* " (student).

> "*[...]at the beginning, I wasn't used to disciplining myself. But after a few weeks, I thought it was really good. It was the first time in a long while that I felt responsible for what I was learning.*" (interview excerpt; student)

> "*[...] I enjoy the course structure. Besides learning educational research methods and how to use new information technology (and this wasn't easy, believe me), we learn a work method or strategy. While at first I found the practical exercises really hard (I wrote you a note three weeks ago), well, they're not that complicated. It's just that usually, I don't really know how to say this, we have a sense of being more rigidly followed and directed. Not that we're not in the Internet course, it's just that we have more autonomy in this class. In other classes, for the assignments, the answers are really set (except for teaching projects). Here, it's like were being pushed to learn by ourselves. At first, it's not easy, but in the end you like it (and I'm not just speaking for myself). Finally, I think that it's very good [...]* "(student email excerpt)

> "*[...] what was interesting in this class was that we could work when we wanted and at our own pace [...] It's as if we had a lot more freedom. At first, I thought that I wouldn't have to work and that this would be an easy class. However, when our team met, we decided to finish the whole course as quickly as possible [...] but to do it well too. And then, we were surprised to see how hard we worked and that sometimes, we even did more than what was asked, as in the gathering of data [...] and we practically finished the whole course in less than two weeks, except for the research project [...]. Having more autonomy was better for us. We worked really hard and we enjoyed it.* "(interview excerpt, student)

How Does the Course Promote Feelings of Competence?

Shin's works (1998) suggest that a Web course stimulates students' feelings of competence. As for Christoph, Schoenfeld and Tansky (1998), they have shown that university students registered in a virtual course (n= 164) had acquired a significantly greater feeling of self-efficiency than students registered in the same class taught the traditional way (control group, n = 231). In their conclusions, these authors also highlight the fact that students registered in the Web course generally felt more competent that their colleagues in the control group.

A Process Which Promotes Feelings of Competence and Allows for Better Knowledge Acquisition: A Strategic Approach

The UQAH Web course was conceived according to two of the Quebec (Canada) Ministry of Education's (1997b) priorities, which were described in its latest plan of action: *A New Direction for Success: Ministerial Plan of Action for the Reform of The Education System*. These priorities are as follows: the development of intellectual abilities and the acquisition of methodological skills. This virtual course advocates a strategic approach centered on knowledge acquisition through the elaboration and completion of an actual research project in a school setting. We choose this approach as it is most likely to promote the acquisition of theoretical and methodological knowledge, as well as to favor the acquisition of a rigorous scientific epistemology. These are crucial for the student who wishes to bring his scientific research project to fruition, this project being the culmination, the result and product of his work and what he has learned.

Virtual Problem Solving and Feelings of Competence

Within each "learning module", the student proceeds to plan his work with the table of contents, the summary and the statement of target abilities. This is the stage of "reflection before practice" where the

student evaluates which strategies he needs to employ in order to complete the assigned tasks. This approach mainly seems to promote greater knowledge acquisition. Indeed, according to Stice (1987) and Tardif (1992), problem solving is one of the most important manifestations of critical thought, of intelligence. For Gagné (1985), problem solving can be found at the top of knowledge taxonomies.

Life-long Learning Comes from Motivation to Learn

Having acquired theoretical, practical and technical experience in the first part of the course, the student will then call upon his methodological skills to consult databases and multimedia tools. The project he and his teammates undertake will have to be completed in an affiliated school and the student will have to present a research report consistent with the scientific community's publication requirements.

The student will have to show some initiative in his choice of a relevant research problem, autonomy in his assessment of essential information and critical thinking in evaluating the validity of existing literature.

In order to execute his research project in a school setting, the student acquires the basic methodology which allows him to continue to learn and he experiences the motivation to bring it to completion. Through this experience, the student significantly integrates methodological skills which will prove indispensable in his professional practice and which will contribute to his feelings of competence.

In addition to getting to know the school setting where the research was executed, the completion of the research project gives the student practical and methodological skills, as well as a deep valorization of his approach. Consequently, the ensuing motivation and great personal satisfaction he feels can but promote, beyond the development of scientific rigor and an appreciation for active research and continuing education, students' feelings of competence and self-determination.

The collected data also highlights the role of the strategic approach and project-centered pedagogy in the promotion of the Web course students' feelings of competence. Indeed, many students appreciate that the way in which the course and its activities were organized facilitated the learning process, and that the approach takes learner's previous knowledge into consideration. As well, for many, the course demystified educational research and made it more accessible to future teachers.

> "*[...] with the theoretical experience and the practical exercises, it's like there's an evolution and it seems easier. [...] in addition, the practical exercises allow us to move forward with our final project. If we do them according to our own (research) theme, we get to the end of the chapters and the project is already almost finished. [...] This structure makes the class easier and helps us learn more.* "(interview excerpt, student)

> "*[...] I wanted to thank you for publishing our research projects on the course site. I must admit that we worked really hard for this class and that we were happy to see our efforts thusly rewarded. [...] Following your suggestions, we'll make the necessary changes and send our article to Vie pédagogique [a professional journal for teachers in Quebec] to see if they are interested in publishing it. We are very excited at the thought that it might be published (even though you did tell us that very few articles are chosen and that even if we're not...) [...]*" (student email excerpt)

Conversation Excerpt in Chat mode

> *Student 5: I used to think educational research was something done in a lab and that it would be nothing but theory.*
>
> *Professor: As you can see, it's possible to execute a small research in a school setting and apply what you studied in the modules.*
>
> *Student 6: That's true. I also thought that researchers or university professors were the only ones who did research. It seems weird to say that I'm doing one too.*

Student 7: I didn't think I could do it. But it's interesting. It makes for a different kind of contact with the students.

Student 8: When they ask me what I'm doing at school, I tell them I'm doing research [...].

"[...] what I liked about the course was that I started from what I already knew. When I read the objectives and the summary, I'd tell myself 'I know this, I don't know that'. That way, I knew what to expect [...]. It was easier to learn [...]. It was also easier to be interested [...]. But what I liked best, I think, was that I got to do a small-scale research at a school. I had the feeling that the principal from whom I had asked for authorization no longer saw me as just an intern [...]. Also, the principal wants me to present the results at the next teacher's meeting. [...] I'm giving teachers a presentation and I'm not even done my B.Ed. [...]. "(interview excerpt, student)

Finally, many enjoyed acquiring the skills to use new information technologies. Some have even stated that it was like completing two courses, one on new information technologies and one on research methodology.

"[...] honestly, I learned a lot in this class.[...] but I also worked really hard [...]. I even feel like I did two classes. One on research methodology, the other in new information technologies. [...] I learned to use email, to chat on line and to send my assignments as attached files. At first it was hard to email and I was really rushing, but at the end, it was easier because I had fewer technical problems. "(interview excerpt: student)

How Does the Course Promote Feelings of Affiliation?

Distance Education: When Students Are Linked by Virtual Bridges

It might be easy to think that a virtually-taught, on-line course is impersonal and that students will feel removed and distanced from their virtual peers in the class. However, the opposite was true. Students in the Web class always have opportunities to communicate with peers, the technical support team and the professor. While the student develops personal autonomy for his work and research methods, he is not isolated as he can also count on feedback from his peers. Indeed, this course was designed to promote an optimal exchange of ideas and information, the confrontation of opinions and viewpoints and the creation of a support system, something which is not always possible in traditional classes which are, for the most part, lectures.

From Chalk to Mouse: An Array of Means of Communication

Through a wide array of means of communication (phone, electronic, paper, and so on), the availability of resource persons to answer students' questions is, in a way, increased. What traditional class allows the student to ask the professor a question 24 hours a day, seven days a week (of course, the answer does not always come instantaneously…)? What other class format allows students to know which member of their group is currently working on or has completed the assigned chapter (this is made possible in the Web class by the use of ICQ)? Which course can claim to offer unlimited class access, anytime of day or night, without time or space constraints, without having to leave the comforts of home, thus facilitating all aspects of student activity?

The qualitative analyses just presented highlight the way in which a distance education course given on the Web eventually assists in the development of the students' motivation to learn. Through such a course, the students and the professor were required to think differently of their relation with time and space and they were challenged to make their own this new approach to teaching and learning.

Conclusion

While the analysis of the results reveal the positive impact of a course given on the Web on the students'

motivation to learn, the analyses conducted also unveil the fact that all students may not be ready to handle such autonomy or self-determination, and that the gap between the university classroom and the virtual classroom is substantial, often difficult to bridge. This gap is particularly evident when we observe the significant decrease in the students' motivation after only four weeks of the course. Many years ago, Gutenberg redefined access to knowledge through the arrival of printing. In the same vein, today's society has been given the opportunity to leap forward (Laferrière, 1997). The integration of new information and communications technology in university teaching presents an enormous challenge and the disruptions inevitably entailed must be faced with both dynamism and caution. For instance, Marton (in press) highlights that "virtual" courses on the Web are often created without sound pedagogical basis. Unfortunately, many resort to such pedagogical innovations because of their newness and the societal interest they generate, without putting forward any learning objectives. There is definitely a need for attractive Web-based courses at the university level that are both motivating and instructive, but care must be taken not to allow the fireworks of technological teaching environments to take away from the course content. As noted by the Conseil de la science et de la technologie (1998), sciences and technology are the engines of innovation and are at the heart of the economic growth of modern societies: they are destined to increasingly gain in stature at the core of any citizen's basic training.

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Model for the development of courses based on Web with acquisition of practical abilities: Experiences of its implementation

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Abstract

For decades we have been attending great economic, social and demographic transformations that have formed a new " partner-technical paradigm ", impelled fundamentally by an impressive technological and industrial development. These events, that have caused an inexorable change in the own content of the formation, also have been the causes of which it modifies the methodology and the average ones to distribute it. In these transformations the idea acquires a special relevance to cause more flexible possibilities of permanent learning for the individual, that it has to do in front, more and more often, to several changes of race or specialization throughout his professional life.

The technologies of the information and the communications, that they represent one of the explaining mayores of the technological change, constitute an essential datum point in the resolution of the adaptation of the process of permanent formation to the necessities of the professional, because its purpose is to obtain a faster and effective access to the knowledge and its update at the moment wished by the same one.

Between the methods that introduce a greater flexibility in their average application are the relative ones to the " formation at a distance " complemented with " multimedia " like support. The possibilities of access at any time and from any place that the network Internet with the capacities offers altogether multimedia that offers the Web are elements that cause the proliferation of courses based on this surroundings of work.

However, he is feasible to distribute by this channel courses in which the objective is the creation of practical abilities in the students? the surroundings of work based on Web cause the acquisition of these abilities? how it must be the didactic exposition of a course of practical character based on Web to obtain his objectives? it is sufficient with " hanging " in the network the contents of the course accompanied by evaluation tests? In this communication a model for the development of a course based on Web appears that has like objective the acquisition of practical abilities in the students.

The exposed model includes the didactic exposition of the course, the variables that affect their development, the most advisable exposition for the accomplishment of the practical activities, the used support of communication and the modules that must contain for the fulfillment of the objectives and the recommendations for the accomplishment of work in group.

The model is explained through an example of application used in the teaching of a remote course of Internet, that it has by objective that the students learn to use the services of the network at user level.

The results obtained in the course by the students and the opinions showed in the different made surveys appear in addition.

Model for the development of courses based on Web with acquisition of practical

abilities: Experiences of its implementation

Introduction

The active methods of education are those that by themselves imply the accomplishment of activities on the part of the student leading it to the acquisition of the knowledge, guided by the professor.

In an educative activity based on active methods of education, the professor exposes the problem or the initial idea, locates to the students in the work surroundings, clarify the objectives and orients the activities to make, which will have like result the " production " of the knowledge on the part of the students, these activities can be made of independent way or in groups and during their execution the professor fulfills the roll of guide in the study clarifying the doubts that take place more and orienting the way adapted to follow, becomes a professor - tutorial rather who acts a as tutorial.

This form to act implies a change of concept on the educative activity, no longer is spoken to teach to the student; but of which the student learns; particularly interesting and effective concept when the educative frame corresponds with a developed course remote that has like main objective the creation of practical abilities in the students. In these cases, the active methods of education play a fundamental paper in the motivation of the student towards the development of the educative activity and the profit of their objectives.

Particularities of distance education

The systems of remote education arose as a complement to the classic methods from actual education.

What is Distance Education?

Learning is a form of education -, planned, organized and directed of systematic form to a potential number of addressees, very elevated, who are developed in conditions of space and even temporary separation, between professors and students. The interaction and the communication of double via (students - professor) make sure with the didactic materials and tutorial support for which different means are used. [5]

The first beginnings of remote education date from 1728, Holmberg (in 1971) discovered a publicity in the Newspaper of Boston the 20 of March of 1728 where it was possibly spoken of a material of autoestudio in shorthand and by correspondence. [6]

The modality of remote education has lasted throughout the time due to:

- the possibility of using nonproductive times for the formation in the job.
- the overcoming of problems of displacement provoked by the distance or physical limitations or of another type.
- for the companies it implies a reduction of the unit costs of formation and the traditional expenses in displacements, diets, absences of the worker, etc.
- the possibility of independently taking advantage of the outstanding knowledge of specialists its place of residence.

The development of the technologies of the information and the communications and specially the network Internet have made possible the growth of this type of education anywhere in the world due to the global possibility of access that allows to people located in distant regions, to accede to the studies that wish or need in remote places.

Specially, the possibilities multimedia that offers the surroundings of work based on Web, together with the services of personal communication and in group, of form offline and online and the transmission of archives through the network constitute the main tools that make the teaching possible of a remote course through Internet.

In these surroundings of work the possibility exists of reducing the characteristic isolation that this type of education presents/displays since the students can communicate to any hour of the day with the professor and other companions of course through the network. In the Web it is possible to expose the contents of the course, to show graphs, images, to reproduce videos, audio, to interchange messages and other activities that allow the development of a course at a distance.

Depending on the temporary coincidence of the participants, the remote courses are classified in:

Synchronous courses

The participants are located in different geographic places but they agree in time for his development, for example, videoconferencia sessions.

Asynchronous courses

There is coincidence in place nor no time between the participants, everyone participates in the course and makes the activities in the schedule that it has available for it, this modality is very advisable for courses of postdegree or continuous formation in which the students have other labor and familiar obligations generally.

The asynchronous courses are those that more complexities present/display in the profit of their objectives, mainly if these are practical, are already affected by the isolation and the demotivation that takes place in the students, because each person participates to different hour and is possible that they never agree in the network.

However, in these conditions, it is also possible to distribute remote courses in asynchronous modality, that imply the acquisition of practical abilities. However, to develop a course of these practical characteristics, it is not enough with " hanging " the contents of the course and the evaluations in a Web page, it is necessary to obtain in the students the accomplishment of practical activities for the acquisition of the required abilities, the elements that must consider are exposed next.

Aspects to consider in the development of a practical asynchronous course through the Web

The courses that are distributed generally through Web have a platform Telematics based on the communication protocol that supports the surroundings of work based on Web and that denominates HTML Technically this platform is made up of pages HTML and programs that allow to make the necessary functions for the development of the course. These functions can be the exhibition of the didactic material of the course, the execution of demonstrations, the resolution of exercises, the communication between the participants, etc.

In the design and development of a practical course at a distance through Web different requirements related to didactic and organizational aspects must be fulfilled.

These requirements are:

- To identify the type of course.
- The exposition of the course and its activities are different for synchronous courses and asynchronous courses; for that reason, to identify like first steps, the modality that will be used to distribute the course is important. Also, the characteristics of the students are elements to consider since he is not equal to design a course directed to students dedicated to on time partial it, example, postdegree courses in which the students generally have just a short time, that directed to students dedicated to the course of complete way.
- To inform clearly to the student on the objectives to reach and the methodology to use.

It is essential that the student knows what it is hoped he will learn and which learning methodology has been set out to use, the activities to develop, the justification of the methods that will be used, the evaluation method and everything that helps him to know the characteristics of the course and guides him in later behavior during the period of study.

- The didactic exposition of the course must be based on active methods of education.

This means that the course must be prepared considering practical that the student will acquire the knowledge and abilities fundamentally through the exercises that make. It means that in the study material the fundamental concepts will be exposed, the problem to solve and the methodology for its resolution; the rest will depend on the work supported by the professor - tutorial in tutorial. Next some recommendations for the processing of the material of the study are related:

- Whenever it is possible, to include resolute exercises that show the resolution methodology to the student.
- To include exercises of practical character with the exposition of the problem and directions for its resolution. The delivery of these exercises to the professor, in their majority, or at least most important, must be of obligatory fulfillment.
- the approach of the evaluativos exercises must entail to the accomplishment of practical activities for its resolution.
- To take advantage of the possibilities the network Internet in which one talks about to searches of information and communication with experts in the matter.
- Whenever he is advisable, to orient the accomplishment of exercises in groups by the advisable thing that is for the learning that the students interchange among them their experiences and points of view.

- A didactic guide must exist.

The methodology of remote study of general form, is not very well-known by the people, since the form of traditional work is the actual one, for that reason the remote work entails greater necessity of explanation on the most advisable forms of performance. By such reason, to enclose to the documentation of the course a guide to the student with the recommendations on how to even study the course and a cronogram of activities in the time, can be very useful and in addition contributes to the profit of the raised objectives.

- The platform Telematics of the course must offer possibilities of personal communication with the professor.

Essential for the explanation of the doubts and particular directions of the exercise, in at a distance asynchronous courses professor is the fundamental form of relation student - professor.

- The students must have a fast feedback of the professor on consultations or the results of sent exercises.

This is an important element for the learning because it allows us to detect the possible errors that can commit the student, is a measurement of the level of assimilation of the knowledge and abilities until the moment and also are a good tool of motivation that arranges the professor.

- The figure of the professor tutorial and their directions must stand out within the platform.

It is a requirement to consider in asynchronous courses fundamentally. The existence of a communication space of the professor is advisable towards the students where the directions are differentiated that are necessary to indicate during the development of the course. Also this space can be used for the systematic update of the contents of the course, for example, present time article shipment, inform faith into erratas, etc.

- The platform must offer possibilities of group communication.

  To have a communication space in group where the students can formulate their questions and the professor to respond them of public way, contributes to the profit of a collaborative learning, where the one ideas become rich with the contributions of the rest. If the course entails accomplishment of works in groups, is advisable that each group also has communication space in group.

- If group work occurs during the course, the directions for this type of work must clear and the methodology used and roles of group members must be well clarified.

For example, the formation of the remote work groups is more difficult than individual work, by such reason, it can be more advisable to propose a division of groups preliminary and later to modify it according to desires of the students; this way to come can be faster and to facilitate the participation of the students who to leave them form the single groups, without hardly knowing itself.

- Contained them didactic to use like support the most advisable format according to the type of student and characteristics of the course.

  The format of support of the course can be paper, CDROM, HTML, video, etc. The selection of the format depends on the characteristics of the course, the students and the form of connection to the Web. For example, if the course is directed to postdegree students, who in their majority connect themselves from their addresses, the format HTML that implies a continuous connection to the Web would not be adapted because the advisable thing would be a format that the study at the seated moment allowed him and place that arranges without implying to have to be connected to the network or in front of the computer.

- To include in the platform possibilities of synchronous communication.

  One talks about asynchronous courses where he is advisable that this possibility in case exists some participants agree in the time.

1. It is advisable that the role of the professor is differentiated from the role of technical assistance.

   This requirement is particularly necessary if the addressees of the course are people with few knowledge of work in surroundings Web, because in general many doubts related to the work in this surroundings take place that can become for the students an obstacle the development of the course. These doubts of technical character must be solved by people different from the professor and thus to reserve the function of this one to solve doubts on the didactic contents.

- It is advisable to develop all the functions of the course within the same platform.

  It is advisable that all the activities related to the course are made in the same surroundings of work, thus is easier and simple the student to adapt to means.

- The platform must offer possibilities to know information on the participants the course and personal communication among them.

  To have this option helps to reduce to the anonymity and the solitude which in general the students face and contributes to obtain the interchange among them, this option usually includes a brief description of each one, profession, labor activity, photographs, electronic mail, etc.

Example of design and development of a practical course through Web

This section presents an example experience in the teaching of a course following the previously

explained model. This course has been distributed, of independent way, by two university institutions in Spain and Cuba: the Centro de Estudios de Postgrados de la Universidad Politécnica de Madrid (CEPADE), its School of Businesses and the Instituto Superior Politécnico "Jose Antonio Echeverría" (ISPJAE) in Havana.

What is CEPADE?

The Centro de Estudios de Postgrados de la Universidad Politécnica de Madrid (CEPADE), http://www.cepade.es, was constituted in 1971 as a result of the increasing necessity to orient the students of the Polytechnical University of Madrid (UPM), with a fundamentally technical formation, in the basic knowledge of the administration and the management of companies. From their beginnings to the present time, CEPADE has formed around 60,000 students, which for of CEPADE an important institution of continuous formation at a distance in Spain, oriented to the formation of postdegree of directors and professionals.

At the present time the supply of formation of CEPADE is integrated by 15 Programs of Masters that cover the totality with the areas of enterprise organization. Jointly with the option of telephone position of a guardian, that constitutes the conventional method used by CEPADE from its beginnings, the possibility is offered to the students of communicating with the professor and the rest of its companions of course by means of the computer, using for it the System of Electronic Conference denominated CEPADE 2000 with access through Web or program specific client.

What is the ISPJAE?

The Instituto Superior Politécnico "Jose Antonio Echeverr'a" (ISPJAE), http://www.ispjae.edu.cu, is the governing center of technical sciences in Cuba. At the moment it counts on six Faculties (Architecture, Civil Engineering, Chemical Engineering, Electrical Engineering, Mechanical Engineering and Industrial Engineering), as well as ten research centers. Eleven specialties are attended that include an approximated matriculation of 5 000 students every year. Of their classrooms 270 foreigners of different nationalities have happened to the labor life more than 44 000 withdrawn among them 1. The postdegree education receives a special attention since the overcoming of the p' ofessionals is vital for the economic and technological development of the country. Every year more than 16 000 students they are registered in 574 courses of postdegree, 31 programs of masters and studies of doctorates.

In the ISPJAE, with the support of CEPADE, it has been begun to develop the formation of remote postdegree leaning in the network Internet and the Web like support of communication between students and professors, forming this way virtual Campus through which to the positions of a guardian and the students are developed they receive updated information of the course.

In both university institutions, this he was the first one attended with these characteristic that was distributed in both countries. Next the characteristics of the course are explained:

Title of the course:

Internet applied to the Company and the Administration. Basic services.

Objectives:

That the students learn to use the basic services of the Internet at user level, without deepening in the technical aspects.

Classification:

Asynchronous post-degree distance course

Duration:

Cuatrimestral course.

Addressees:

Students of any profession, mean level and superior with few knowledge of work of the computer science surroundings.

Didactic exposition:

The student must acquire practical abilities in the work with the network Internet, for that reason the course is based on the independent practical work of each student.

The course is divided in Didactic Units where the fundamental concepts and philosophy of execution of each service are explained. The program of the course is in Annexed 1.

The explanation of the contents in each unit is based on the development of solved exercises, for example:

1. the explanation of the operation of service telnet is made through the development of an example of connection telnet to a library where is each one of the screens that are obtained.
2. the explanation of the design of pages HTML is based on the development of a page that is processed as the concepts are explained until completing it in the end.

When finalizing each Didactic Unit the student must make a Test of Evaluation where practical exercises are oriented; the results of these exercises must be sent to the professor for their overhaul and qualification, the shipment is made through electronic mail, this way the students acquire abilities in the use of this service. In Annexed 2 are examples of Tests of Evaluation.

Also the accomplishment of an exercise in work parties for the learning of the service IRC (Internet Relay Chat) is included. By its own nature, IRC is more advisable to learn in group.

Criteria of evaluation

In order to approve the course the students must give all the Tests of Evaluation, being the component of evaluation practical and pass final actual theoretician in who the acquired knowledge are valued. This examination is made in different seats near the geographic zones from the students and is a requirement to obtain the Certificate of Postgrado of the University.

Support of the Didactic Units

The format is used paper and HTML. In the processing of the Didactic Units the format is used paper to be the one that adjusts more to the necessities, tastes and customs of the addressees of the course.

In the processing of the Didactic Units the format is used paper to be the one that adjusts more to the necessities, tastes and customs of the addressees of the course.

In order to explain the configuration of the programs pages HTML that the students must consult offline taking advantage of the possibilities multimedia and of hypertext are used that they have, this way in addition learn to work in this surroundings which also is objective of the course.

In the course of CEPADE, the 3 first Units of the course they are sent to the students by postal mail, the 5 remaining Units the students copy them through Internet and with it they practice the service of FTP (File Transfer Protocol) that learns in the first units. In the ISPAJE, the documentation it is given by postal mail in a CDROM; although the option exists to copy it through Internet, it is not often used by students in Cuba due to limitations in the speed of the connection.

Support of communications

The platform used Telematics as supported in both Universities is different. In CEPADE the FirstClass Intranet Server is used, a product of the Canadian company Softarc (http://www.softarc.com) that allows the access through Web and proprietary client software. In the ISPJAE a platform designed specifically for this application is used, involving CGI programs in Perl to format content in HTML on the fly.

Both applications are based on the existence of a communication space in denominated group Virtual Classroom where the students formulate their doubts and the professor - tutorial or another student responds. Also the platform contains other elements that make different complementary functions from support from the course.

The modules that compose each platform are the following ones:

In CEPADE

In this platform the group communication spaces denominate electronic conferences. An electronic conference is a plank species in that the interventions of the participants are ordered of chronological form and includes in each one of the subjects or open topics. To the power to read all the members of the conferences all the messages that this one contains, is possible being used for the communication in groups.

The organization established in CEPADE platform is of an electronic conference for each course. In each conference the enrolled students write messages that contain doubts or commentaries on the study matters and the professor writes messages with his answers, being created a " virtual classroom " where each student learns of the contributions of the professor and the rest of the participants, facilitating itself of this form the collaborative learning.

The structure of the virtual classroom for the course of Internet Basic Services is in the following Figure:

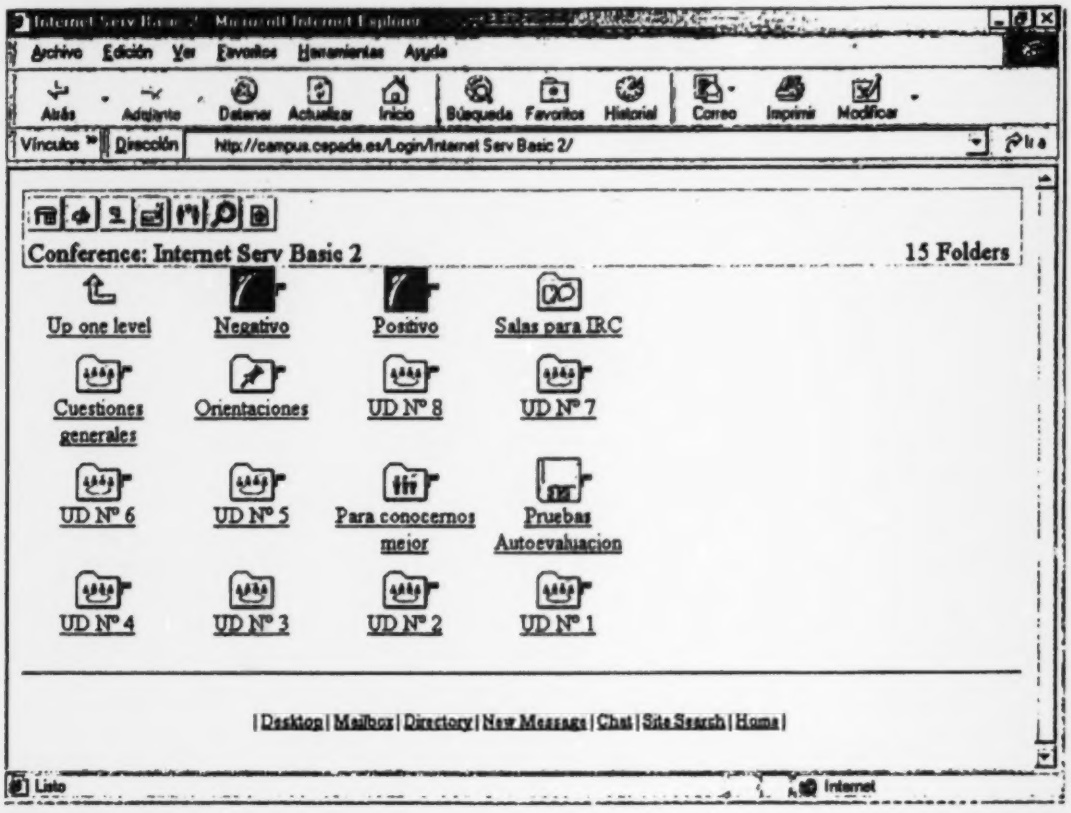

Figure 1

The components of the virtual classroom are:

UD X: Group communication spaces destined to the resolution of questions related to the contents and Tests of Evaluation of each Didactic Unit. In Figure 2 is a message example that contains a student's question and the professor's answer.

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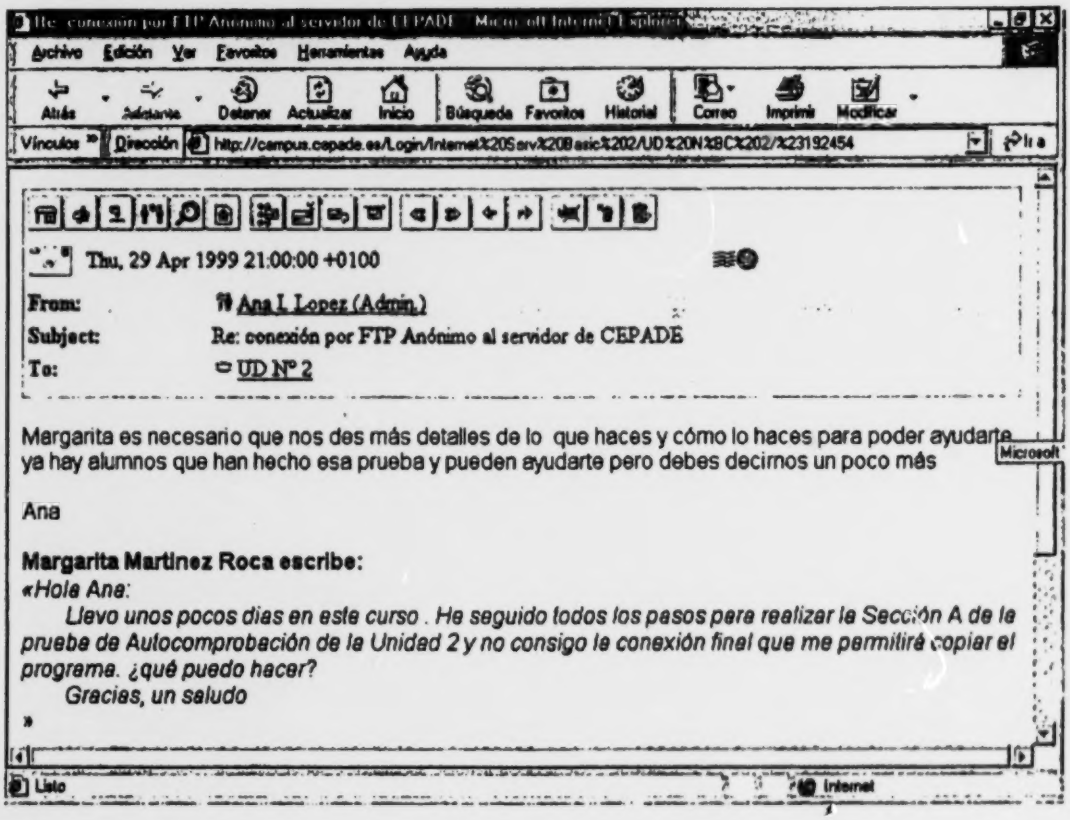
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección
Thu, 29 Apr 1999 21:00:00 +0100
From: Ana I. Lopez (Admin.)
Subject: Re: conexión por FTP Anónimo al servidor de CEPADE
To: UD Nº 2
Margarita es necesario que nos des más detalles de lo que haces y cómo lo haces para poder ayudarte ya hay alumnos que han hecho esa prueba y pueden ayudarte pero debes decirnos un poco más
Ana
Margarita Martinez Roca escribe:
«Hola Ana:
Llevo unos pocos dias en este curso . He seguido todos los pasos para realizar la Sección A de la prueba de Autocomprobación de la Unidad 2 y no consigo la conexión final que me permitirá copiar el programa. ¿qué puedo hacer?
Gracias, un saludo
»
Listo
Internet

Figure 2

Cuestiones Generales: For the resolution of questions and commentaries of general type.

Orientaciones: Group communication space in which the students can only read, the professor is the only authorized one to send messages, here is where the professor sends directions on the course directed to all the students. Figure 3 shows a screen from this conference.

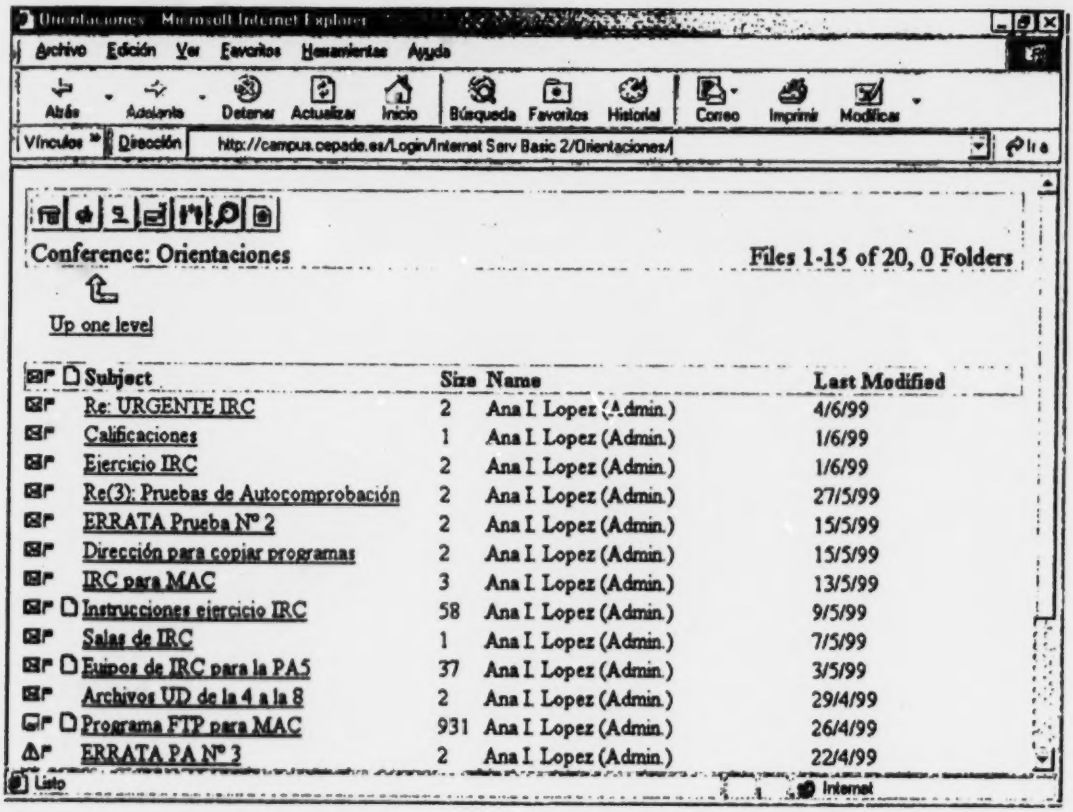
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección http://campus.cepade.es/Login/Internet Serv Basic 2/Orientaciones/
Ir a
Conference: Orientaciones
Files 1-15 of 20, 0 Folders
Up one level
Subject Size Name Last Modified
Re: URGENTE IRC 2 Ana I. Lopez (Admin.) 4/6/99
Calificaciones 1 Ana I. Lopez (Admin.) 1/6/99
Ejercicio IRC 2 Ana I. Lopez (Admin.) 1/6/99
Re(3): Pruebas de Autocomprobación 2 Ana I. Lopez (Admin.) 27/5/99
ERRATA Prueba Nº 2 2 Ana I. Lopez (Admin.) 15/5/99
Dirección para copiar programas 2 Ana I. Lopez (Admin.) 15/5/99
IRC para MAC 3 Ana I. Lopez (Admin.) 13/5/99
Instrucciones ejercicio IRC 58 Ana I. Lopez (Admin.) 9/5/99
Salas de IRC 1 Ana I. Lopez (Admin.) 7/5/99
Equipos de IRC para la PA5 37 Ana I. Lopez (Admin.) 3/5/99
Archivos UD de la 4 a la 8 2 Ana I. Lopez (Admin.) 29/4/99
Programa FTP para MAC 931 Ana I. Lopez (Admin.) 26/4/99
ERRATA PA Nº 3 2 Ana I. Lopez (Admin.) 22/4/99
Listo
Internet

Figure 3

Pruebas de Autoevaluación: In this conference are the Tests of Evaluation that the students must copy through Internet

Salas para IRC: Electronic conferences for the interchange between class to coordinate accomplishment of the IRC exercise. In Figure 4 is an example:

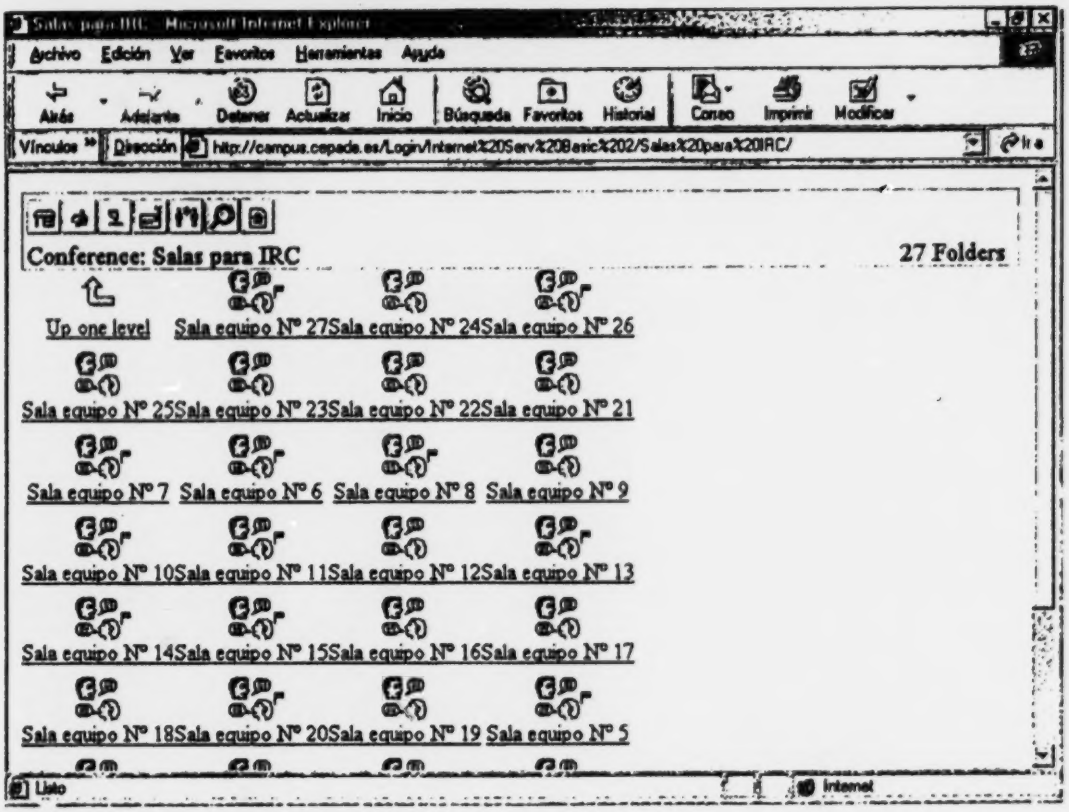
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección http://campus.cepade.es/LoginInternet%20Serv%20Basic%202/Salas%20para%20IRC/
Conference: Salas para IRC
27 Folders
Up one level
Sala equipo Nº 27
Sala equipo Nº 24
Sala equipo Nº 26
Sala equipo Nº 25
Sala equipo Nº 23
Sala equipo Nº 22
Sala equipo Nº 21
Sala equipo Nº 7
Sala equipo Nº 6
Sala equipo Nº 8
Sala equipo Nº 9
Sala equipo Nº 10
Sala equipo Nº 11
Sala equipo Nº 12
Sala equipo Nº 13
Sala equipo Nº 14
Sala equipo Nº 15
Sala equipo Nº 16
Sala equipo Nº 17
Sala equipo Nº 18
Sala equipo Nº 20
Sala equipo Nº 19
Sala equipo Nº 5
Listo
Internet

Figure 4

Para conocernos mejor: Space reserved for the presentation messages that the students send.

In addition, in the System, each user arranges in the system of a personal mailbox in that they appear his personal messages and, through as, can interchange the tests of evaluation and the qualifications with the professor. Also a tool of Deprived Char it for the synchronous conversation between the participants connected at the same time exists similar to IRC.

Several common conferences exist to which all the users belong; these have different objectives. For example:

Cafeteria: Conference dedicated to informal conversation.

Kiosco: Contains published articles of interest in press means.

Noticias Cepade: Contains the CEPADE new developments.

Ayuda del Sistema: Conference dedicated to interchange on technical problems and their solution.

Directorio de Fotos: It contains the photos of the professors and students of CEPADE.

These are shown in the following figure.

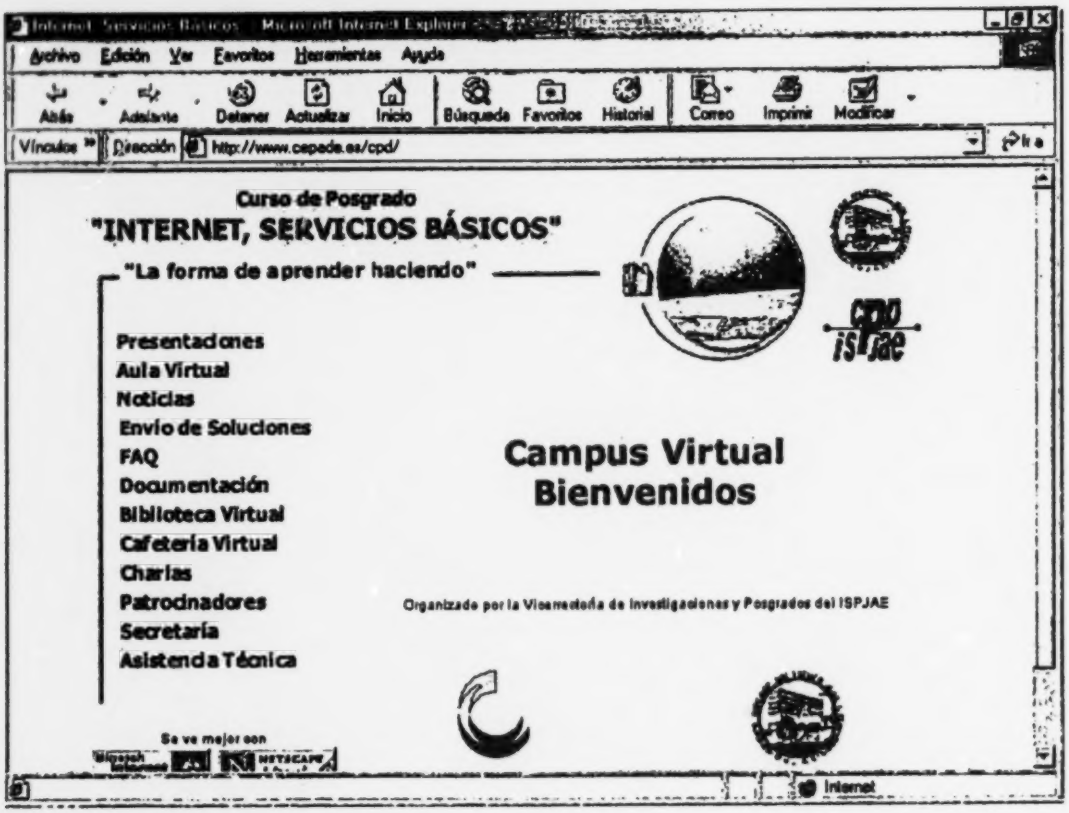

Figure 5

In the ISPJAE:

The platform denominated Telematics virtual Campus is provided with accommodations in a Web server, for the group communication spaces was used script programmed in Perl that a BBS in this surroundings executes; the personal messages are sent through connections HTML of electronic mailIn Figure 6 is an example of the initial screen from entrance to the virtual Campus.

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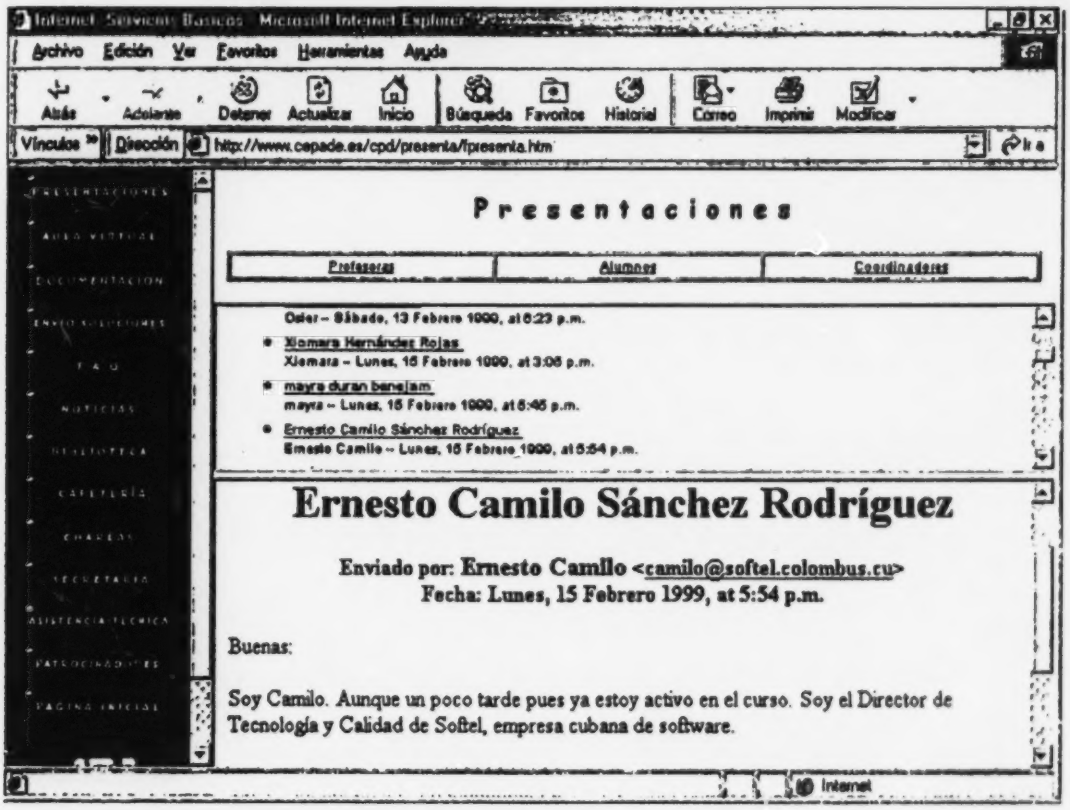
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección http://www.cepade.es/cpd/presenta/fpresenta.htm
Presentaciones
Profesores Alumnos Coordinadores
Odor – Sábado, 13 Febrero 1999, at 6:23 p.m.
Xiomara Hernández Rojas
Xiomara – Lunes, 15 Febrero 1999, at 3:06 p.m.
mayra duran benejam
mayra – Lunes, 15 Febrero 1999, at 5:46 p.m.
Ernesto Camilo Sánchez Rodríguez
Ernesto Camilo – Lunes, 15 Febrero 1999, at 5:54 p.m.
Ernesto Camilo Sánchez Rodríguez
Enviado por: Ernesto Camilo <camilo@softel.colombus.cu>
Fecha: Lunes, 15 Febrero 1999, at 5:54 p.m.
Buenas:
Soy Camilo. Aunque un poco tarde pues ya estoy activo en el curso. Soy el Director de Tecnología y Calidad de Softel, empresa cubana de software.
Internet

Figure 6

In this case, the platform is comprised of the following components:

Presentations: Contains the presentations of the professors, coordinating equipment and students. In Figure 7 is an example of the interface to review and create student presentation messages:

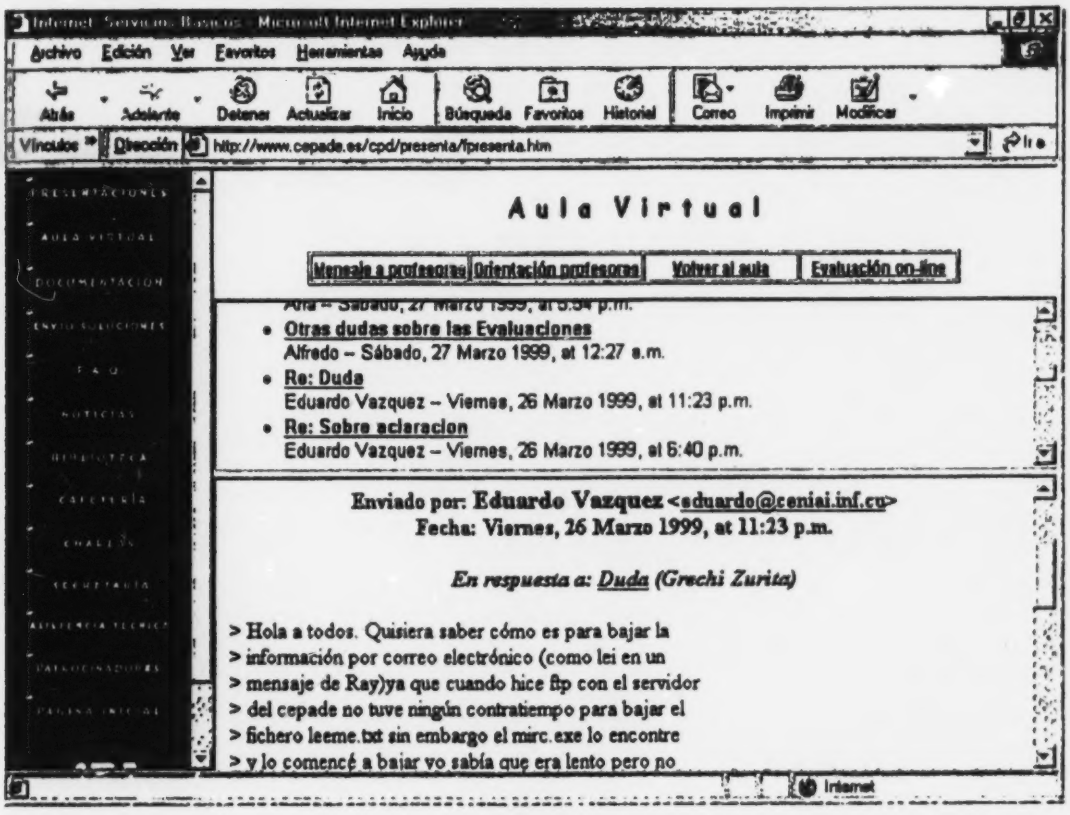
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección http://www.cepade.es/cpd/presenta/fpresenta.htm
Aula Virtual
Mensaje a profesores Orientación profesores Volver al aula Evaluación on-line
Otras dudas sobre las Evaluaciones
Alfredo – Sábado, 27 Marzo 1999, at 12:27 a.m.
Re: Duda
Eduardo Vazquez – Viernes, 26 Marzo 1999, at 11:23 p.m.
Re: Sobre aclaracion
Eduardo Vazquez – Viernes, 26 Marzo 1999, at 6:40 p.m.
Enviado por: Eduardo Vazquez <eduardo@ceniai.inf.cu>
Fecha: Viernes, 26 Marzo 1999, at 11:23 p.m.
En respuesta a: Duda (Grechi Zurita)
> Hola a todos. Quisiera saber cómo es para bajar la
> información por correo electrónico (como lei en un
> mensaje de Ray)ya que cuando hice ftp con el servidor
> del cepade no tuve ningún contratiempo para bajar el
> fichero leeme.txt sin embargo el mirc.exe lo encontre
> y lo comencé a baiar yo sabía que era lento pero no
Internet

Figure 7

Virtual Classroom: Group communication space in group destined to the explanations of questions, in Figure 8 is a message example that contains the student question and answer from the professor:

BEST COPY AVAILABLE

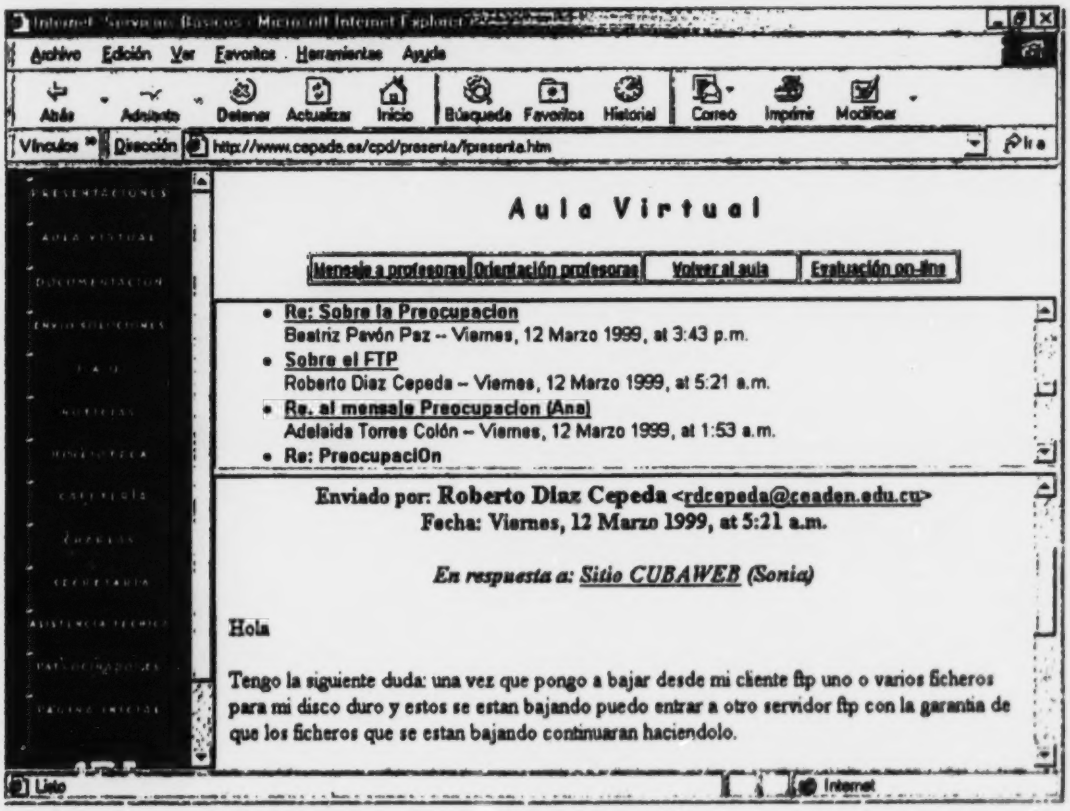
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar
Vínculos Dirección http://www.cepade.es/cpd/presenta/presenta.htm
Aula Virtual
Mensaje a profesores
Orientación profesores
Volver al aula
Evaluación on-line
Re: Sobre la Preocupacion
Beatriz Pavón Paz -- Viernes, 12 Marzo 1999, at 3:43 p.m.
Sobre el FTP
Roberto Diaz Cepeda -- Viernes, 12 Marzo 1999, at 5:21 a.m.
Re. al mensaje Preocupacion (Ana)
Adelaida Torres Colón -- Viernes, 12 Marzo 1999, at 1:53 a.m.
Re: PreocupaciOn
Enviado por: Roberto Diaz Cepeda <rdcepeda@ceaden.edu.cu>
Fecha: Viernes, 12 Marzo 1999, at 5:21 a.m.
En respuesta a: Sitio CUBAWEB (Sonia)
Hola
Tengo la siguiente duda: una vez que pongo a bajar desde mi cliente ftp uno o varios ficheros para mi disco duro y estos se estan bajando puedo entrar a otro servidor ftp con la garantia de que los ficheros que se estan bajando continuaran haciendolo.
Listo
Internet

Figure 8

Through the connections in the superior part of the Virtual Classroom, the students can:send personal messages to the professors, receive general directions from the professors, and take true/false tests online.

Documentation: From this module the students can copy the documentation of the course through Internet. The documentation is in format PDF.

Shipment of Solutions: So that the students directly send to the professor the results obtained in their exercises.

F.A.Q.: Frequently Asked Questions, is a summary of the most important questions that they have made the students and their answers as a aid in the study; this way the students more leaving behind, can bring up to date themselves quickly.

The News: The new developments of course of administrative Hindu to him are published.

Library: Contains connections to other pages of Internet where the student can find information extended on the subjects of the course.

Coffe (Cafeter'a): Asynchronous communication space in group destined to char them informal.

Chat (Charlas): Synchronous communication space in group to be used by the students who prefer it and are connected at the same time.

Technical Attendance: asynchronous communication space where the doubts of technical character with the Equipment of Technical Attendance are consulted.

Development:

Data on the development of both courses follow:

	CEPADE	ISPJAE
Years of teaching	3	2
Amount of students	822	175
Geographic Location	Spain and 33 countries of Europe, Asia and America	Cuba, Germany, Brazil, Belgium, Argentina
Average of qualifications (on the basis of 10)	8,5	8,7
Percentage average of given tests of evaluation	85%	80%
Amount not approved	25	1

Criteria of the surveys and interviews to students:

The qualification granted to the course by the students in a scale from 1 to 10 has been 8.

95% of the students who finalize the course, think that the course has fulfilled its expectations in a High and Very High level.

100% of the students raise that they have had to work intensely in the accomplishment of the exercises.

80% finalize the course with abilities related to the use of the computer in general.

The percentage of abandonment of the course is of 50%; most of the students who leave the course makes at the beginning, with the study of the first Didactic Units, the fundamental cause that they raise is the amount of exercises and the complexity, most of which leave have little knowledge of computer science reason why the course at the beginning usually is to them very hard and difficult to make. In order to diminish these problems the course is being modified in the following aspects:

- to add an initial "leveling guide" where general computer concepts are explained as aid to the students with less experience.
- to transfer contents of the first Units towards the last ones so that study flows more naturally.
- to distribute less important subjects in a manner that makes it clear they are optional.

Conclusions

In the present work a model for the teaching of an asynchronous course based on Web has been developed using active methods of education, which are based on the accomplishment of exercises practical of the students to obtain the knowledge.

It gives the complexity of the remote work and the problems of isolation and demotivation that usually appear, the model of development for a course of this type contemplates didactic and organizational aspects.

The requirements that must be fulfilled for the design and development of a course with these characteristics are:

- To identify the type of course.
- To inform clearly to the student on the objectives to reach and the methodology to use.
- The didactic exposition of the course must be based on active methods of education.
- A didactic guide must exist.
- The platform Telematics of the course must offer possibilities of personal communication with the professor - tutorial.
- The students must have a fast feedback of the professor on the made consultations or the results of sent exercises.
- The figure of the professor - tutorial and their directions must be stood out within the platform.
- The platform must offer possibilities of communication in group.
- If during the course works are made in groups, the directions for this type of work must clear and be well clarified the rolls that must carry out each which and the methodology that will be used.
- Contained them didactic to use like support the most advisable format according to the type of student and characteristics of the course.
- To include in the platform possibilities of synchronous communication.
- It is advisable that the role of the professor is differentiated from the role of technical assistance.
- It is advisable to develop all the functions of the course within the same platform.
- The platform must offer possibilities to know information on the participants the course and allow personal communication among them.

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Annexed

Annexed 1: Programming of the course

Didactic Unit 1: What is INTERNET?

1. Historical review
2. The communication protocol in Internet
3. What is the commutation of packages?
4. Directions in Internet
5. The System of Names of Dominio (DNS) the
6. Services of Internet
7. Architecture client-server
8. Ways of connection of Internet
9. Some limitations in the work with Internet

Didactic Unit 2: The classic services of INTERNET

1. Transference of files (FTP)
2. Electronic mail (email)
3. Interactive remote Connection (telnet)

Didactic Unit 3: World Wide Web

1. Hypertext and Hypermedia
2. Language HTML Address of Web (URL)
3. Navigation through browser
4. Systems search
5. Execution of other services from the navigator
6. Other additional services

Didactic Unit 4: Communications in group

1. Lists of distribution
2. Groups of discussion
3. Talk - IRC
4. Telephone Conversations

Didactic Unit 5: Basic design of Web pages

- Structure of a page HTML
- Tags of head
- Tags of style
- Tags that gives to format
- Tags of listing
- Tags of links
- Tags of graphs

Didactic Unit 6: Applications in the companies

1. Publicity, Marketing and Communication
2. Channel of distribution and support to the Electronic client
3. Intranet and Extranet

Annexed 2: Example of Tests of Evaluation 2

Exercises on the classic Internet services

Section A

1. To copy the CuteFTP program from the Web page of the course
2. Using the previous program, to make an Anonymous FTP to one of the following sites and to send as answer the one of the copied archives this file and description (to consider that the file is of small size), indicating direction of the server and trajectory where one was, with the following format:

Servidores FTP	Trayectoria	Descripción
ftp.unt.edu	/library	Documents with detailed instructions on how to access computerized systems of libraries of several universities of the world
rtfm.mit.edu	/pub/usenet/news.answers/puzzles/archive	Hundreds of puzzles
wuarchive.wustl.edu	/systems/ibmpc	Material related to PCs, including software

Section B

1. To send a message to the direction cpd-soluciones@cepade.es indicating in the body of the message, its complete name and including the company/signature of automatic way, sends a copy, does not hide, of the message to its own direction.
2. To respond to the direction cpd-soluciones@cepade.es the welcome message that received in its mailbox at the beginning of the course

Section C

1. To connect through telnet to one of the following libraries:

hollis.harvard.edu - Library of the University of Hardvard

library.mit.edu - Library of the Technological Institute of Massachusetts (MIT)

eucmvx.sim.ucm.es - Complutensian University of Madrid (to use like password LIBRARY, in capital letters)

2. To do bibliographical searches that it prefers using different criteria

3. To send the results of the one of the searches, indicating name of the library, criterion search and possible the most detailed Card of one of books or found magazines.

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Web-based Evaluation for the Convenience of Students, Markers, and Faculty

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Abstract

We describe WebCoDe, our Web-based course management system that was originally developed to support on-line marking of assignments and tests for our large, first-year Computer Science courses, but has been extended to support a broader spectrum of evaluations such as short-answer, multiple-choice, true-false, fill-in-the-blanks, etc. The on-line specification and automated evaluation of various types of questions, plus the system's extensive facility for consistent, detailed feedback and seamless interaction among students, TAs and instructors, enables it to be effectively used for evaluation in a variety of courses.

Web-based Evaluation for the Convenience of Students, Markers, and Faculty

Introduction

We have been teaching Computer Science to large numbers of first-year students, utilizing up to a dozen teaching assistants as markers for labs, assignments and tests. For this to work well, consistency and detailed feedback are essential components: consistency because different students will have the same evaluation marked by different TAs; detailed feedback because in programming questions, no two students will have the same answer, and comments on specific problems are essential to the learning process. Additional feedback, such as that which places a student's marks among those of classmates is also beneficial for students and instructors. We have found that on-line marking of assignments and tests can help provide those characteristics and integrates well with on-line mark reporting. It also can be easier for the marker and instructor.

Several Web-based course management and evaluation systems exist. Unfortunately, they are not useful in our domain because they do not support adequate levels of feedback for students and evaluators, and do not facilitate the utilization of TAs for marking, student feedback, and lab/assignment preparation. The seamless incorporation of TAs in the course management system is essential in our educational environment, and to the utility of the system from the point of view of the students. For example the popular WebCT [goldberg:96, goldberg-salari:97] does not incorporate TAs, nor does it provide appropriate in-context feedback about evaluations. In addition, although it provides useful functionality, such as the ability to create on-line evaluations, message board, and context-sensitive help, it does so only through its GUI and therefore cannot be used on text-only browsers, which is an issue of concern for our users with special access needs. Systems designed specifically for on-line evaluations, such as BOSS [joy-luck:98], and WWWAssign [martin:97], are designed to partially automate marking of student assignments and labs. As well as reducing marking time, this provides more consistent marking, particularly over a range of markers. We also find these systems are inadequate for our purposes because feedback is limited to grades and out-of-context notes attached to the returned evaluations; plus they lack the functionality required for on-line course delivery.

In this the sequel, we describe our environment, WebCoDe, that provides on-line specification of

evaluations, provides on-line submission of evaluations, provides on-line marking with convenient, structured and detailed feedback, and facilitates interaction among students, TAs and faculty. We concentrate on the more novel aspects of WebCoDe - those relating to in-context, detailed and appropriate feedback for evaluations, the appropriate incorporation of TAs into the environment, and the interaction among students, TAs and instructors.

Interaction Among Students, TAs, Instructors

Our system allows several levels of "users" for a course: students, TAs, lead-TAs, and instructors, with each type obtaining an appropriate, customized view of the course information, marks and analysis. Because WebCoDe can administer more than one course at once, users may have multiple levels within the WebCoDe environment, e.g., a user may be a TA for more than one course in the WebCoDe environment. The user may also have different roles within different courses. This occurs typically when a user is a TA for one course and a student in another. A course may be maintained in the WebCoDe environment over several terms/years, causing a user to have different (or the same) status among different offerings. For example a student may become the TA for a course in which s/he was a student in previous years, or a student may enroll in the same course in different offerings in order to upgrade her/his mark. Each WebCoDe course may be assigned any number of instructors, lead TAs, TAs and students.

WebCoDe maintains an internal database of course information and uses this information to determine the role that users have within particular courses. For example, if a user is a student in CPS400 and a TA in CPS225, then WebCoDe will assign her student status when she accesses WebCoDe site CPS400, but TA status when she accesses WebCoDe site CPS225.

Each kind of user is presented different views of the WebCoDe menus, in a largely hierarchical fashion. The instructor view contains all the available functions and features, while the others see less depending on status and usage. Options available only to instructor-level users are course-creation functions, course editing functions, TA marking synopses, and overall student marking synopses and statistics. TAs may view student marking synopses and statistics only for the students assigned to them, while a student may view only her own feedback and marks. All users may view overall comparative statistics.

The instructor view of the CPS104 main marking page for term Winter'99 is as follows in Figure 1, with specific comments appearing below the page.

Figure 1: Main Marking Menu

There are several items to note about the instructor main marking page:

With the link Change Course Info, the course code, term, etc., is entered, and subsequently modified. When course information is modified, the new information is automatically saved into the database. An example of modification is as follows in Figure 2.

Figure 2: Course Info Modification

The Web page URL can also be added/modified from the Change Course Info link. The URL specified should be the instructor's main information page for the course. It would be accessible subsequently

from the link at the top of the main marking page.

The submit-directory should be the name of a directory that would form a repository for work submitted on-line by students. Typically, this would be a directory in the instructor's filespace so that it is not directly accessible by students and TAs, but rather is indirectly accessible by them only through WebCoDe. If desired, the instructor could access submitted files directly through this directory; however, this is not necessary, as all submitted files are viewable from the WebCoDe environment.

The instructor may change her own password via Change Password, and reset the password for any TA, lead-TA or student for a course via Reset User Password. All original passwords are maintained in the database and are viewable via "View Original Password". Typical password-type error checking is performed; for example, verifying that the TA for whom the instructor is attempting to change the password is a valid TA for this course, etc. Passwords are maintained so that users can access WebCoDe from any Internet service provider, and thus are not restricted to accessing WebCoDe only through the university servers. This was especially important to TAs who desired the ability to mark evaluations from home.

TA Records is used to define a template for information the instructor wishes to maintain about TAs, and to add and modify records for each TA. The template items are selected from the choices on the page in Figure 3. Once the instructor has created a template for TA records, the actual data is entered at once from the following page in Figure 4. TA records may be input individually, or pasted into the text area, one line per TA. Any delimiter between fields can be used, but must be defined in the line following the text area. In the following example, the delimiter character is space(s). Once the data is entered, the instructor is presented with a confirmation page on which fields are arranged in fixed columns so that any error in input will be obvious; the instructor can then correct any errors she has made. This method of TA data entry was selected because often such data is available on-line and can simply be cut-and-paste into the text area. In this example, we have extracted appropriate lines from the Unix /etc/passwd file and pasted them into the text area.

Figure 3: Define TA Info Template

Figure 4: Enter TA data

- When the Hostname link is followed, the page below in Figure 5. is displayed. This screen displays every hostname currently stored in the database. For security reasons, users may only access WebCoDe from one of the valid hostnames (with a valid userid and password as outlined above.) The instructor can add, delete or modify hostnames in the text area. Every hostname that is entered in the text area is verified to confirm it is a valid hostname. Invalid hostnames are then listed, and the instructor must return to the previous screen to do corrections. When all hostnames entered are valid, they are automatically saved in the database.

Figure 5: Define Valid Hostnames

An evaluation is created, modified, marked, etc., via the Evaluations link, as displayed in Figure 6. When creating an evaluation, its name and the number of questions must be defined; defaults are assigned to the remaining fields, if they are not filled in by the user.

Figure 6: Evaluation Creation Page

An evaluation-definition page such as that of Figure 7 is presented following an evaluation creation. If the user wished to modify an existing evaluation, she can enter its name on the previous screen and proceeding directly to the following evaluation-definition screen. In the following screen shot, the instructor has defined 2 question so far for the Lab 1 evaluation. Blank question templates are always appended so that the instructor may define more questions than initially anticipated at time of evaluation-creation.

Figure 7: Evaluation Definition Page

Each evaluation item has an order drop-down list, which the instructor can use to re-arrange the order in which questions appear on the final evaluation. In addition, there is a text field where the instructor can enter the number that will appear beside the question and its mark value. Another drop-down list contains a selection of evaluation item types with default selection "Multiple Choice - 3 choices" (for no important reason). Pre-defined evaluation item types are as follows:

- Multiple Choice - 2 choices
- Multiple Choice - 3 choices
- Multiple Choice - 4 choices
- Multiple Choice - 5 choices
- Multiple Choice - 6 choices
- True or False
- Fill in the blanks
- Short Answer
- Essay Question
- Practice Lab
- Instruction
- Delete this Question

The instructor can enter the answers/solutions to questions of the appropriate type, such as Multiple Choice, True-False or Short Answer on the page presented in Figure 8. Figure 9. displays the evaluation in its final form. Information such as the due date, expiry date, number of attempts allowed and total value of the evaluation are displayed at the top of the screen. The final version of questions is displayed below.

Figure 8: Evaluation Solution Definition

Figure 9: Evaluation in Final Form

The link Assign TAs to Sections/Groups is used to equate a particular TA with her group of students for marking purposes. The course itself consists of a number of sections, but we have found often that one section is too large a group for one TA. Thus, we allow "groups" to refer to parts of sections. From page in Figure 10, the instructor assigns TAs to sections/groups via pull-down menus containing group numbers and TA names.

Figure 10: Assign TAs to Sections/Groups

Consistent and Detailed Feedback

There are several aspects of our system that contribute to good, consistent, detailed marking and feedback:

- The system automates the submission of assignments (including information about submission times), the recording and analysis of marks, and the interaction among student, marker, and professor relating to a particular submission.
- Instructors may view all TA marking. On synopsis pages the instructor views a hierarchical structure of TA and student names and evaluation names. Those evaluations that have not yet been marked appear highlighted. The instructor may follow any evaluation link to view the actual submission and feedback (if any).
- The marking takes the form of detailed, *in context*, annotations of the submission. This feedback allows the student to quickly and easily see where their submission is deficient, or exemplary.
- The professor can submit on-line marking schemes for a particular assignment so that markers can easily tick-off the features of the assignment that meet, or miss, the requirements.
- When markers come up with new annotations - over and above those suggested by the professor - those annotations (including associated mark penalties) are immediately available to all other markers. This means that all markers will likely use the same annotations and mark values, thereby improving consistency.
- The system is fast and intuitive for markers to use, so there is little motivation for markers to not follow the guidelines provided by the program for a particular submission.

In the following pages, we present screen shots pertaining to the marking and feedback of computer programming assignments; this type of evaluation is most likely to require individualized, in-context feedback. Figure 11 presents a marking page as would be seen by a student's TA and instructor, with comments following.

Figure 11: Marking Page for wrichard's Lab 1

Near the top of the page information about the program submission is presented. It lists the name of the program (lab1.scm) and its submission date. The link Results of run... can be followed in order to see what output this program produced when it was automatically run against the test programs provided by the instructor. In some cases this can be set up to automatically calculate the entire or a partial mark for this evaluation.

Next is a comment box and assignable mark for the entire evaluation. When marked automatically, the mark is set automatically, even for partial marking. When partially marked, the marker must access the pull-down mark list in order to select a mark to complete the marking. This is obviously also necessary when no automatic marking is available. The marker can enter feedback about the evaluation as a whole using the comment box. (We plan to extend WebCoDe to also automatically include a top-level comment when it automatically provides a mark.)

The term "Scheme Mode" indicates that WebCoDe has automatically detected that the program it is

viewing has been written in the Scheme programming language.

The remaining text in the page is the actual student submission. The hyperlinks appearing in the student submission were generated automatically by WebCoDe. When a TA or instructor follows any such link, she can attach a comment specific to that portion of the evaluation. These links later appear for the student as well, so that she may follow them to view the feedback.

Student - centered, instructor - engaged: Lessons from the Asynchronous Frontier

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Abstract

Most of us are familiar with asynchronous learning, formal correspondence courses, independent studies, tutorials) and informal learning. With the addition of online teaching and learning and the resources of multimedia technology and the world-wide Web, a new pedagogy is coming into its own. This technology dovetails with the concept of

formalized life-long learning, and changes radically teachers and learners, as well as teaching and learning. Drawing on the experience of designing, developing and delivering courses in humanities and science, as well as interdisciplinary courses, we wish to present the challenges, pedagogical and otherwise, involved in online teaching. As we do so, we also wish to elicit group discussion of best practices in the world of online teaching in Higher Education. The specific areas we shall address are the delivery of a Latin/Classics Program via the World Wide Web, and interdisciplinary courses in Graduate Liberal Studies, Ecology, Peace Studies, and Women's Studies.

Student - centered, instructor - engaged: Lessons from the Asynchronous Frontier

Introduction

Long before the "technological revolution," educators were familiar with formal asynchronous learning through correspondence courses, independent study courses, tutorials, and thesis reiteration. Educators routinely advise a wide range of individuals interested in informal learning, primarily in the text-based world, through recommended books and book lists. With the addition of online teaching and learning and the resources of multimedia technology and the world-wide Web, a new pedagogy is coming into its own. This technology dovetails with the evolving concept of formalized life-long learning, and has the potential to change teachers and learners as we change the environment of teaching and learning. Drawing on the experience of designing, developing and delivering courses in humanities and science, as well as interdisciplinary courses, we wish to present some challenges, pedagogical and otherwise, that we have faced through online teaching. As we do so, we also wish to elicit group discussion of best practices in the world of online teaching in Higher Education. The specific areas we shall address are the delivery of a Latin/Classics Program via the World Wide Web delivered by one primary instructor,1 and an interdisciplinary Class Book initiative involving the collaboration of 15 faculty members.2

Program Delivery: Classics

Overview and Context

There has been a steady decline in enrollment in Classics, which includes study of Latin and Greek, and Classical Studies, which investigates the Classical world through a combination of text study and interdisciplinary approaches. 3 This is due to a change in emphasis in education, the elimination of teaching about the classical world in many primary and secondary schools; no longer is a knowledge of classics the basis of a Liberal Arts education in most institutions of higher learning.4

I am the only Classicist at the University of Maine, and one of two in the University of Maine System, which consists of seven campi (campuses). After teaching an ITV course several years ago, I requested from Ednet in Augusta the opportunity to teach Elementary Latin via that medium.5 My request was turned down, the assumption being that there would not be sufficient enrollment. Jim Toner suggested I

consider offering the course via MaineAccess, which was a clumsy bulletin board based product that permitted a text-based course with no frills. In the next few years, I would find myself changing software, sometimes by the semester; I now work with WebCT, modifying it as much as possible to meet my needs. (I have yet to investigate Blackboard, which is supported by UNET. Recognizing the potential for delivery of Latin and Classics to a broader range of people, I sought for and received permission from the Dean of the College of Liberal Arts and Sciences to consider the University of Maine System my catchment area, and proceeded to develop my Classics Program for distance delivery, primarily Web-based.

Believing that an academic certificate program was needed along with all the professional certification programs developing through online and other distance modalities, I put together a Certificate of Classical Studies, an integrated group of courses equivalent to a free-standing minor. At present, most of the traditional Latin major is available through WebCT, as are about six Classics courses (in translation).

Latin, as a text-based language, is one of the few languages easily adapted to online teaching. The logistics are simple; the courses are simply skill-building courses. This, of course, is my view!

Challenges

For whom is this course? Student centered.

In academe, we hear a great deal about student centered courses. Yet I doubt whether those who use the term when marketing the University have much more in mind than assuring parents that their child will have individual attention and access to instructors. In the past, "student centered" has also meant small classes, where the student can be known. Some innovative teachers have also used the idea of contracting for grades as a jumping off point for student centeredness in a specific class.

What is the methodology of teaching Web courses such as mine, in language and culture?

In a Web course, however, the term "student centered" takes on a rich meaning. It goes something like this: The student, matriculated or not, shops around for an online course, lights on one of mine. All my courses are public access courses, meaning that a prospective student can enter the course Web site and check it out. A visitor may visit the course as much or as little as he or she chooses. Maine being a land grant institution, public access courses "make sense."

Upon registration, the student is asked to introduce himself or herself, and to tell the class something about themselves. The goal is to begin to weave the learning community that may more naturally arise in onset classes. Live chat is always available for students who wish to meet in real time in cyberspace, and I also hold live chat office hours.

I inform the students that they are co-creators of the course. I present foundational information. They take that information and publicly discuss it, whether it is asking on the bulletin board what the passive periphrastic is, or, in a translation course, wondering why slavery was not race based in the ancient Roman world. Class members join in the conversation as they encounter it, and often return again and again to a forum discussion.

Without student creation of the course culture through developing classroom culture, the synergy that fuels the phenomenon of learning is sadly lost. When this occurs - and it does in the traditional seminar as well as in an online course - the course is less stimulating, less engaging.

The engagement of students and instructors together in the educational endeavor holds bright promise as we create this "new" pedagogy by retaining the best elements and practices of the old.

To me, when considering challenges to the realization of engaged, student-centered teaching over the Web, the following issues, some specific to my own discipline, others generalizable, present themselves.

Logistics: Asynchronicity.

Asynchronicity can best be defined as access to education, *id est*, a Latin course, by anyone, anytime, anywhere. This approach is not supported by University Administration. This approach is assumed by a majority of students, especially non-traditional students. There are potentially 3 audiences for any course: traditional students who expect to work according to a syllabus and receive a grade at the end of the term; Life-Long, non-traditional students who accept and often pursue the possibilities of asynchronous learning; students who begin the class with the intention of finishing the work within a given period of time, often in order to graduate, but, since there there is the incentive of not attending class and asynchronicity, they put the course on the back burner. The situation results in quit a few bookkeeping headaches; our only option at this point, is to give students who have not completed - due to a literal understanding of the term *asynchronicity* - incomplete grades.

At the University of Maine, these incomplete grades revert to a failing grade if not addressed within a certain time-frame.

Self- Motivation.

Students who, consciously or no, expect the class to be conducted in ways similar to an on site course, often get into trouble. A student who signs on for a Latin course must know how to pace himself or herself. The student must be sufficiently self-motivated to make a schedule for class work, and stick to it as much as possible. The student having difficulties must become proactive, utilizing whatever materials are at hand, including live, online office hours.

What I have found, though, is the tendency toward procrastination on the part of many students, and panic at the end of the course, especially if financial aid is involved in course completion. I am far past the time in my career where I am interested in being pulled into such a crisis. Even when students are fully informed of the expectations I have of the course, just as traditional students in traditional classes, there are always students who carry incomplete grades for years. I do believe students find it easier to "blow off" online courses.

Preparation.

Language study, as other skill-building courses, requires an initial set of tools. These tools are called English grammar. Latin pedagogy relies upon the student's ability to make the connections between basic grammatical concepts in English and the appearance of those concepts in Latin. For example, in order to understand how cases work in Latin, a student must understand what a case is, and that English has a case system, although it is not as clearly marked as in other languages in the Indo-european language family. The student must be able to connect the idea of "nominative case" in Latin to "subject" in English and "accusative case" to "direct object" in English. The student must know what is meant by "person" in English when speaking of a verb, in order to understand the fact that in Latin the personal pronoun is contained within the inflected ending of the verb.

Online grammar aids are of limited use when the basic vocabulary of grammar eludes the student As a stop-gap, I explain all I can during online office hours, and link grammatical concepts to definitions in the lessons I present.

A few proposed solutions.

Regarding asynchronicity.

This is difficult! I don't know whether institutions are flexible enough to accept asynchronicity going beyond the parameters of the term or session - at least for students in degree programs. A related issue is that of financial aid - often the student comes to rely on financial aid to the point

that he or she is taking the online course to fulfill a certain number of credit hours for financial aid eligibility. Where a student may originally have applied for financial aid in order to attend college, a reversal occurs where the student is attending college in order to receive financial aid. Thus the crisis of, often, a mother with several children relying upon the financial aid she receives as a student to provide the basics for the family.

I am not standing in judgment of the situation. We do know that the Federal Government basis financial aid on need, and that receipt of aid is contingent upon finishing a schedule of classes within a given amount of time. I applaud the fact that there are now ways distance students can receive financial aid. What I question is the lack of fit between the idea of asynchronicity and the reality of the complex and entrenched institutions within which a matriculated student and university professor must work.

This also speaks to the issue of access. If the student receives financial aid, does that mean that he or she must always work within the parameters of the session, whereas the student who is able to afford the course or courses outright can plan on truly asynchronous learning?

Self-motivation.

I feel all we can do in this case is to have a clear set of expectations and realities available in the description of the course. After that, it comes down to the teacher himself or herself. This is nor profound - perhaps in the discussion you will have some ideas.

Preparation.

The high school preparation of a student is often insufficient in terms of successful language learning. The preparation of the Life-Long Learner may or may not be readily at hand. My solution is the development of a mini course in English grammar specifically aimed at teaching/reviewing English grammar for students of foreign languages. This course will be a 0 or 1 credit adjunct available to all students, but aimed at making the connection between language study and English grammar. I have advanced this course this course in Latin through its integration into my lower level courses, and have this as ongoing project. Meanwhile, I make several hyperlinks available which review English grammar, style, etc.

II. From INT490 to INT491 -- "Lies, Deception and Heroification" to "'A Midwife's Tale' and the Social Web": The Class Book Web Course Interdisciplinary Faculty Development Program.

Introduction

"Distance learners and teachers pioneer turn-of-the-century higher education and universities weave Webs and develop virtual real estate in cyberspace."

"Higher education entrepreneurs lead the development of educational Web space as universities scramble to establish a meaningful 21st century identity and agenda."

"Distance teaching and distance learning redefine the 20th century notions of instructional support as the new multimedia sweeps into education and universities require faculty development and technical assistance."

Do we read headlines or hear radio news with subjects like the three quotes above? Does the "conventional wisdom" accept these three statements? If these three statements are fact, what does that mean? What roles will universities play in the "education supermarkets" of the cyber world?

At the core of this issue is the university faculty. How do university faculty prepare for asynchronous learning environments where students have more flexibility in scheduling and pace completing assignments? How can the university administration fulfill responsibilities to

faculty development interest in distance learning and Web course development, instructional design, information technology, new multimedia and technical support, graduate assistantships, grants and overload compensation?

Heroifying Faculty Development. A recipe:

Ingredients:

At the University of Maine, we have a successful 8-year Class Book program. Each year the Faculty Senate chooses a book that first year students will read in conjunction with ENG 101 - Introduction to Writing Composition.

The provost and vice president for academic affairs asked the vice-provost for undergraduate education to explore the development of a 400-level course around the theme of the 1999 Class Book, Lies My Teacher Told Me by James Loewen.

To investigate this, a meeting of vice provost, dean of lifelong learning and director of distance education took place.

Next, a meeting of all the above plus departments chairs of history, sociology, English, coordinator of ENG 101 program, and the Class Book project coordinator.

Next, the Class Book Project coordinator, the Director of Distance Education and the coordinator of the English 101 program met with the Distance Education Advisory Committee.

Class Book Web Course Advisory Committee established.

Having begun concocting the course, it was time to recruit the *sine qua non* - faculty.

Faculty Recruitment: General call for faculty interest.

Small meetings with individual faculty, director of distance education and new multimedia associate.

Draft Syllabus Development

Course approval process initiated by Director of Distance Education.

Approval by Web Course Advisory Committee, Dean of Lifelong Learning, the Undergraduate Program and Curriculum Committee, and Vice Provost for Undergraduate Education.

A team of 15 faculty under the leadership of INT490 Advisory Committee co-designed and co-taught a 15-week asynchronous course using WebCT Dream Weaver-enhanced course design software and FirstClass Intranet Client computer conferencing.

15 faculty accepted responsibility for teaching a portion of a lesson or a complete lesson.

Faculty designed INT490 with 15 Lessons.

Outcomes:

An interesting general education requirement offering to students whether they live on campus in Orono, Maine, or if they ordinarily commute to campus, or attend at an off campus center or high school site, or sitting at their home computer anywhere in the world.

With a small investment in course development time and course delivery time, an interdisciplinary team of 15 faculty members, including James Loewen, author of Lies My Teacher Told Me,

co-design and co-teach INT490 Lies, Deception and Heroification, a course taught entirely on the Internet.

This course was well-enrolled and much commented upon. The students in the course were required to post their essays, and each student was expected to give reaction and feedback to their peers for each essay posted. There was also much "hallway" talk - discussion of aspects of the course via an open bulletin board. Faculty joined in these, according to their interests, level of engagement.

Future steps:

In April, the class book advisory committee sought - and won - approval for INT491 "A Midwife's Tale and the Social Web," a new faculty development project based on Pulitzer Prize winning A Midwife's Tale: The Life of Martha Ballard, Based on Her Diary, 1785-1812, the 1999-2000 Class Book.

We have also decided to integrate a Class Book Web Course faculty development component into the Distance Education Advisory Committee (DEAC) Web Grant program and annual DEAC Web Forum faculty presentations.

Twelve of the fifteen faculty returned to co-teach INT490 as a 5-week summer session course. The same faculty have committed to teach the course again in Fall 1999.

All agreed to weekly INT490 faculty meetings.

The class Book Advisory Committee will explore development of INT492 in 2000.

Updates and lessons learned:

Dr. Toner will fill in this section as a conclusion to this section upon completion of the summer course and reflection upon it.

Conclusion.

In this paper, we have commented upon two equally important areas of Web-based teaching and learning: the responsibilities of student and teacher to co-create a learning community, and the issue of faculty development through a radical collaboration of instructors, technological support, and administrative support.

As we rethink the ideals of engaged learning through the potentialities of online distance education, challenges arise to institutional policy and traditional conceptualization of Higher Education from what "makes" a "credit" to the basis of remuneration of collaborative teaching projects to the issue of FTEs (Full-Time Teaching Equivalents) in a truly asynchronous course. As teachers always have done, we are inventing it as we go, calling upon each other, our technology specialists and our students to realize this new pedagogy.

Response and discussion.

Professor Sandra Haggard is respondent. She will briefly discuss her thoughts as a scientist involved in online teaching. We shall then open to group discussion.

Sandra Haggard, unfortunately, is at present incommunicado in the Dominican Republic.

1. Tina Passman, Chair, Department of Modern Languages and Classics, Associate Professor of Classical Languages and Literature.
2. Jim Toner, Director, Distance Education, Division of Life-Long Learning.
3. Classics, like other disciplines in the Humanities, suffers from the perception of irrelevance and

outdated, leading to no desired material end or ideological insight. As with other traditional disciplines, there are factions within Classics that foment these perceptions.

4. Lest you fear that you are about to hear a polemic about educational standards and tradition, let me allay your fears! I feel that, if my discipline can regroup and acknowledge that the world of higher education has changed, as alluded to above, an interest in Classics will surface among the public.
5. EDNET, formerly headed by George Connick, is now a system-wide utility of the University of Maine System, UNET.

Author Information

Sandra Haggard works in the biological sciences, ecology and women's studies. Since her work with electron microscopy, she has been interested in technological innovation.

Tina Passman chairs the Dept. of Modern Languages & Classics. She offers a Classics Program on the Web, and works in classics, classical tradition, & peace studies.

Jim Toner directs the distance education component of the Division of Life Long Learning. He has investigated and taught alternative pedagogies, and has developed the "class book" Web course, which is collaboratively offered by 15 faculty members.

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Training Managers of the Distance Education Enterprise: A Master's Degree in Distance Education

Eugene Rubin, University of Maryland University College, United States

Abstract

In 1996, the University of Maryland University College (Eugene Rubin) and Carl Ossietzky University of Oldenburg, Germany (Ulrich Bernath) received a grant from the International Council on Open and Distance Education and the AT&T Foundation to develop and deliver an on-line international seminar entitled: The Virtual Seminar on Distance Education: Professional Development for University Faculty and Administrators. The seminar used a unique team teaching model using seminar leaders along with internationally renown distance education experts and ran for 10 weeks. This Web-based seminar was run 3 times with resounding success, and drew as many administrators and managers as it did faculty. As a result of this collaboration, a Master's degree in Distance Education management has been proposed and is under development at UMUC and the initial courses are scheduled for delivery in January 2000. While the initial focus of the seminar was on faculty training, it became clear that the training and development of an organization's managers (educational, government, non-profit and business organizations) was a critical aspect of distance education's (and Web-based training and education) proliferation and success. This then resulted in the development of a professional degree program aimed at that population.

The content of the original seminar is scheduled to become the basis for the initial foundations course in the Master's program. The Master's degree is conceived of as having a significant international component and further collaboration is planned between the two original institutions to achieve this. In addition, a number of certificate programs are planned for specific target groups. The process of curriculum development for the program, target marketing, program objectives and course content will be described. Several models of course delivery will be discussed, including the model used in the original seminar. Models of cross-institutional and international collaboration will be described. Open discussion will be encouraged regarding appropriate curriculum for the professional training of distance education managers.

Training Managers of the Distance Education Enterprise: A Master's Degree in Distance Education

Introduction

In the midst of an institutional rush toward distance education, some crucial issues are in danger of being forgotten. There are very few formal opportunities for faculty and professionals in higher educational institutions to develop knowledge of and skills in distance education, and particularly in the management of distance education. While there are a very small number of degree or certificate programs which grant certification in the field of distance education, most full-time faculty cannot reasonably attend these programs because they are either not easily accessible, require full time study for too long of a period, or are too expensive. Several institutions also offer short programs or certificates, but these often relate to specific technologies and skills. Distance faculty and administrators often end up learning how to develop, deliver and support courses through the trial and error method (getting occasional advice from their more experienced colleagues.) They do this with almost no background in distance education theory, pedagogical models, or positive examples of good practice.

It was felt that there are two critical needs that emerge from this analysis:

- There is a need for a faculty and administrator training program in which new distance education faculty and administrators can develop a broader perspective of the general foundations of distance education and can learn critical knowledge and skills in the field.
- There is also a need for a global perspective among distance education faculty and administrators so that they can benefit from the knowledge of how other institutions approach distance education and

solve problems, particularly in cross-border and cross-cultural contexts.

Given that need for such development and training in distance education, the author, Eugene Rubin, along with a German colleague, Ulrich Bernath, submitted a proposal in 1995 to participate in the "Global Distance Learning Initiative" of the International Council for Distance Education (ICDE), who, in collaboration with the AT&T Foundation, offered a series of grants for research/exploration in the area of distance education. They were awarded a grant for 1996/97.

The original objectives of this project for professional development in distance education were:

- Develop a 10 week course entitled "A Virtual Seminar for University Faculty and Administrators: Professional Development in Distance Education".
- Offer the course via the Internet to a maximum of 45 participants (15 from Germany, 15 from Maryland and 15 from various locations around the world) January through March 1997, as a pilot project, prior to a global implementation. The participants would consist of faculty and professionals working in a variety of institutions in higher education.
- Evaluate the seminar outcomes and revise the course.

The Structure of the Seminar

A decision was made early on to offer the seminar via the Internet using easily accessible and wide-spread computer-based technologies. Given the 10 week syllabus, the ongoing work commitments of the participants, and their location in different time-zones, it was also decided that real-time synchronous technologies were not appropriate. Asynchronous computer communication appeared to be the most appropriate mode of communication, and it was decided that Web- based computer conferencing would be best to support the structure and objectives of the Seminar. It was felt that with this decision, the method and the content of the Seminar were consistent. Both the Internet and the World Wide Web were coming to the fore, and were potentially providing great opportunities for distance teaching, as well as teaching in general. For us, the Web-based seminar was a positive example of the environment for which the participants were being trained. The Web-based conferencing system that was selected was HyperNews, which is a Unix-based "threaded" system (the titles of the various messages look like an outline or "tree", so that you can follow the "thread" of a particular part of the discussion.)

The general strategy of the Seminar was to encourage faculty development in two areas:

- Theory in distance education. By this we meant the foundations, history, theories, models and the technology-base of distance education.
- Practice in distance education. By this we meant the applications and the actual process of developing, delivering, supporting, guiding, evaluating and administering distance education courses and programs.

The syllabus for the Seminar was as follows:

Week 1: Introduction and practice with the conferencing system

Week 2: Foundations of Distance Education - with guest expert B^rje Holmberg

Week 3: Institutional Models of Distance Education - with Gary Miller

Week 4: Theories of Distance Education - with Otto Peters

Week 5: Technology of Distance Education - with Tony Bates

Week 6: Introduction to Distance Education Applications and Project Planning

Week 7: Student Support

Week 8: Instructional Design

Week 9: Technology

Week 10: Summary and Conclusion, Project reports

In addition, the general Seminar environment was supported by :

- A "home" page , which led to the various weekly conference discussions, as well as allowed for general announcements;
- A brief self-submitted biography and photograph from each participant;
- An introduction/orientation document; which explained the logistics, schedule and other details of the planned virtual seminar;
- A readings pages, which listed the readings for each week;
- A short tutorial for learning to use the Web-based conferencing system;
- A separate computer conference to obtain technical assistance, as well as an email link to the conferencing administrator.

The core professional development strategy of the Seminar was one of combining the idea of master practitioner with that of peer interaction. Each part of the syllabus was achieved by common discussion of a topic supported by interaction with a well qualified "expert" in the field of distance education. Thus, the design of the Seminar was one of a meeting of peers and not one of a relationship between students and teacher.

The Seminar Leaders were well aware that they were dealing with qualified professionals who were actively employed in academia, business or government. We were also aware that many of the academics were engaged in a regular teaching calendar. In other words, the participants were a group of working professionals who had commitments other than the Seminar. With that in mind, several aspects of the design of the Seminar are notable:

- The start of the Seminar in January and the 10 week length of the seminar was chosen so as to avoid interference with the various academic class calendars of the participants;
- Readings were selected and kept small to minimize preparation requirements during the weekends prior each seminar week;
- "Required" participation was estimated to be three to five hours per week; and we expressed our expectation that the participants should regularly log-in on Mondays and Fridays, plus "a day or two in between;"
- Attendance at the post-seminar face-to-face evaluation meeting was required for the participants from Germany and Maryland (to compensate for the free access to the seminar).

In addition, the core Seminar feature of visiting "experts" was a unique opportunity to interact (in almost real-time) with distinguished scholars and practitioners. It was reasoned that this would be a strong motivator for faculty to persist in the Seminar, since this opportunity would not normally be available elsewhere. The seminar leaders jointly provided the overall frame for each of the weekly discussions.

The Outcome of the Seminar

Overall, the Seminar clearly achieved its goals. The extensive debriefing at the face-to-face evaluations, as well as the on-line evaluation, indicated a high degree of satisfaction with the Seminar. Participants entered the Seminar with different personal objectives and goals, yet practically all felt that they had a positive experience, and to at least some extent met those personal goals. Specific data will not be described here, but several outcomes bear noting:

Participation data. The participants did not participate in the Seminar equally. Some "appeared" (made a comment) in every module, and some in only a few. Some made many comments within a module and some only one or two. On the surface, the participation rate in any one module ranged from 34 (out of

45) to 13 (out of 45). This was somewhat discouraging until we debriefed the participants at the face-to-face evaluation sessions. Here we found that almost all of the participants were actively reading the Seminar, even when they did not actively "speak". Our evaluator, Helmut Fritsch, termed this phenomenon "Witness Learning", to indicate that many participants were actively engaged in the Seminar even though they were invisible to the others.

Volume of participation. The volume of the contributions was quite large–almost intimidating. The Seminar resulted in the equivalent of over 250 single spaced printed pages. The volume of the participants (45) and the experts/leaders (6) were approximately equal.

Structure of the interaction. Each module developed differently from the others. Depending on the goals of the module (Content focused vs organizational) and on the "style" of the expert/leader, the discussion involved different processes. Some experts were more directive than others, using a lecture type style of presentation, while others were more personal, directing their comments to individuals by name.

Technology of the Seminar. The technology required by the seminar was not a barrier to participation. However, the logistics of an international seminar required some preparation and planning. Because of the time differences (often up to 9 hours or more), participants and experts/leaders had to adjust their schedule. A functional day was often only a window of several hours (9 AM Pacific Standard Time was the equivalent of 6 PM Middle European Time), and the comments a particular participant put in today may not be read by another until tomorrow. Yet all of the participants seemed to be able to adjust to this without difficulty.

In 1998 two further Virtual Seminars were run on a self-supporting basis. These seminars followed the format of the first seminar, but with various refinements which streamlined the process. Each of these seminars was similar to the first in that there were approximately 40-45 participants from a wide variety of countries around the world. Yet each had a character of its own, with unique conversational patterns and topics of discussion. Despite this, the overall results of the seminars was quite consistent, with similar participation patterns and a similar large volume of discussion. In fact, the second and third seminars had even larger volumes of discussion.

The Conclusions of the Seminar

A virtual Seminar is reading and writing and thus demands much of the participant's time. The written contributions in the asynchronous discussion process differ from a synchronous and flighty chat and are fundamentally different from a conventional seminar. Engaging in a virtual seminar and using computer conferencing is a much more reflective process than face-to-face interaction. One types out one's thoughts, rereads them, often edits them or adds to them, and sometimes even spell checks them. After carefully inspecting what one has written, they are then submitted for others to read. The meaning of the written word is measured and sincere, and it persists. It can be read and reread by others long after the termination of the seminar. Peters therefore characterized the virtual seminar as an example of a "knowledge building community."

Conventional seminars do not allow all participants to contribute at once. They usually do not encourage a response from each and every individual. Moreover, it is difficult to attend to and keep track of a long sequence of oral contributions. A long list of written contributions is treated differently. You can stop when you wish and easily compare and contrast various contributions. You can go back and reread for clarification. The asynchronous computer conference is, in a way, a renaissance of reading and writing communication. We can now hope that it will bring us new and extended opportunities for teaching, training and learning, regardless of time and space constraints.

The positive results of the virtual seminar likely correlates with the interest of the participants in their own growth of knowledge and acquisition of skills. Clearly the relevance of the content is related to the participant's persistence as well as their attitude. Our data clearly indicates a positive affect and a continuing involvement of the participants in the process of the seminar.

The discussion process in the virtual seminar needs leadership, direction and moderation to best use the opportunities offered by the media and the technology. In particular, it is important to get as much of the activities on the "surface" as possible. There is also an emotional component to the seminar. Participants not only reported a resultant positive or negative affect in the discussions, but also reported the establishment of varying degrees of personal relationships with fellow participants. We felt that this emotional component was critical to the success of the seminar.

One of the goals of the seminar was to enable a cross-cultural sharing of experiences, ideas and opinions. This was deemed to be a potential positive outcome because

- Distance education occurs in some manner in almost all countries of the world and in a wide variety of ways, and using a variety of levels of technology;
- Distance education is increasingly becoming a world-wide enterprise in that courses are now capable of being delivered almost anywhere in the world; and
- The cultural and regional bias that each participant brought to the discussion would result in a broader and deeper learning.

Our three seminar experiences definitely supported the above supposition that the cross-cultural aspects of the seminar would result in positive outcomes. Not only was a broad variety of opinion expressed, but often these opinions prompted discussion that reflected a more comprehensive analysis and understanding of critical issues. This was particularly true of technology related discussions, where participants from nations that were not highly technology enabled often came up with innovative and useful solutions to problems that did not occur to participants from high technology countries.

By being globally accessible via the Internet, the content and interaction allowed participants to differentiate and generalize across cultural borders and among the diverse practices within the field of distance education. It gave depth to the learning and forced the participants to think beyond their own cultural and environmental constraints.

The seminar was also an example of distance education in practice. One of the primary goals of the seminar was to inform distance educators about issues related to the practice of distance education. We essentially "practiced what we preached." It even allowed some of the more experienced participants to obtain a better understanding of their own student's experience within distance courses. Finally, we consider our virtual seminar to be an outstanding success. The model has already been replicated in several other environments.

Where do we go from here?

Perhaps the most important outcome of the seminar was the growing awareness among the seminar leaders that, while the seminar was a "success", their overall goals were not being achieved. It was the hope of the leaders to develop a truly scalable training program. However, the seminar, as it was designed, was an additional workload on top of their distance education administrator's role. It seemed impossible to continue it in that form, and it also seemed too difficult to turn into an ongoing activity at each of their institutions.

Furthermore, it was the seminar leaders' impression that the seminar discussions often raised more issues than they resolved, and it became clear that there were a myriad of skills and concepts which needed to be further developed by the seminar participants. In a way, the seminar just began to scratch the surface of the training issue.

Thus, with both of the seminar leaders coming to the same conclusions and raising these issue in their respective institutions, the idea developed that each of their institutions should seriously consider offering some sort of formal training for distance educators which would lead toward a credential. It was out of these discussions, both within and between their two institutions, that the idea of a formal Master's degree in the management of distance education came about. A decision was made that the University of Maryland University College (UMUC) would develop and offer a Master of Distance Education degree, and that Carl von Ossietzky University of Oldenburg, would partner in this enterprise

by developing and offering a certificate that would be fully integrated into the UMUC Master's degree.

The Master of Distance Education Degree

The Master of Distance Education is designed to serve the needs of individuals responsible for leading and managing distance education within government, business, non-profit and educational organizations. It is therefore worthwhile to examine the potential need in some of these areas.

A recent report by the International Data Corporation (IDC) market research firm entitled ONLINE DISTANCE LEARNING IN HIGHER EDUCATION, 1998-2002, says that the number of college students enrolled in distance learning courses is growing by 33 percent per year. The number of students in distance learning classes is projected to reach 2.3 million by 2002. The proportion of two year colleges offering distance learning classes is projected to reach 85% (up from the current 58%), and the proportion of four-year colleges offering such classes is projected to reach 84% (up from 62%).

Peterson's Guide to Distance Learning Programs (1998) cites that of more than 1000 colleges and universities recently surveyed: 762 offered distance learning courses in 1996 and 860 offered them in 1998. Furthermore, of the proportion of those schools that offer distance learning courses, 68% used the Internet for delivery.

This rapid growth in distance education (DE) suggests a strong potential demand for the training of professionals in the field. A large majority of 2 and 4 year institutions in North America presently have either an individual or an office that is in charge of distance education. Many of the schools have multiple offices and/or multiple employees.

Many, if not most, DE positions require individuals who either have extensive experience or specific training in the field of distance education. Because most of the explosive growth in distance education has been recent, there are only a limited number of experienced personnel presently working in the field. There are only a few degree programs in the field and these have produced a limited number of graduates, so there are only a small number of individuals who have been specifically trained in DE as compared to the total number of present and future (predicted) positions.

Further evidence of demand for trained personnel in the field of DE is the explosive growth in private and non-profit organizations that are marketing distance education products and services in the education/training field. Such companies as RealEducation (eCollege), Collegis and Sylvan Learning Systems are marketing turnkey distance education systems to companies, universities and colleges. Organizations such as WebCT, TopClass, Blackboard, and Lotus/IBM are marketing software and related technologies for the delivery of Web-based distance education. Other organizations such as V-Tel and PictureTel are releasing new versions of their video conferencing products, and many of the telecommunication companies are directly marketing distance learning services. Hundreds of companies have sprung up that have developed training and education courses and they are marketing these products directly to businesses, educational institutions and government. Most of these organizations either did not exist five years ago or did not offer these services and products. Many of them did not exist two years ago. The direct implication of this is that there is an increasing number of jobs that will require the skills and knowledge that is imbedded in the proposed degree program's curriculum. Thus there is already a pool of potential students working in the private sector that are appropriate candidates for the proposed program and there is some assurance of a future demand for the graduates.

It is useful to examine other programs because this provides further insight into the issue of demand. Presently, there are only a limited number of programs that are offering a similar degree. For example, similar degrees are offered at the following institutions: Florida State University, George Washington University, Nova Southeastern University, Athabasca University (Canada), The British Open University, The University of London, and The University of Southern Queensland (Australia). A number of these degrees have been offered for several years and their enrollments are healthy, if not exceeding their original estimates. Their program sizes are primarily limited by their resources for delivery (e.g. number of permanent faculty.)

Until recently, there have not been many institutions that have had extensive experience delivering distance education (and thus have a reasonable number of qualified practitioners to teach the subject). Internationally, institutions that have been leaders in distance delivery have initiated academic training programs (for example, the well respected British Open University, Athabasca University, and University of Southern Queensland). UMUC intends to follow their model of teaching what they both know and do.

The Masters of Distance Education (MDE) is a program designed to produce individuals capable of managing the distance education enterprise within educational, business, government, and non-profit organizations. In a rapidly expanding field, the graduates of the MDE will be prepared to engage in the planning, budgeting, development, delivery, and support of distance education and distance training programs. Students will:

- gain a perspective on the history and theory of the field of distance education;
- learn to access and critique the relevant literature in the field;
- understand the organization systems and structures that support DE;
- understand the emerging business environment of DE, including issues relating to cost, marketing and competition;
- develop skills in the selection and application of DE technology and media;
- learn about and practice the application of asynchronous and synchronous technologies;
- understand and apply a variety of DE pedagogies within the materials and course development process;
- learn about issues of leadership and management within a distance education or training organization;
- learn about the globalization of DE, and how the international and cross- cultural aspects of DE are critical to operating in world markets;
- learn about the design and construction of the Virtual University, and the provision of a wide variety of student services and support, including the distance delivery of the virtual library, student advising and counseling services, course and program registration and financial services, and job placement services; and
- learn about the design, development, and operation of the corporate virtual university and related training environments, including course development, database development, student registration and tracking, etc. and;
- analyze issues related to faculty training, faculty compensation, copyright ownership, and quality assurance.

The Master of Distance Education covers a broad range of topics that need to be addressed by distance education and training professionals. Graduates of the program will be able to develop a vision for the implementation of distance education within an organization and communicate that vision effectively to others; develop strategic goals and business plans for distance education within an organization; design and implement the necessary support services for a distance education program; analyze, design and recommend an organizational distance education technology plan, and manage the implementation of that technology in distance delivery; function effectively as leader, manager and team member within a distance education or training organization. Students will develop competencies in organizational and management processes; leadership and change management; information technology; business development, strategic action planning, and problem solving; and will understand the importance of both ethics and social responsibility. This is an applied degree, aimed at developing the managers of distance education and training organizations of the future.

It is intended that the proposed program should address a global audience. This is because a) the field of Distance Education is of an international character, with expertise, research and models that cross national boundaries, b) The market for graduates of the program crosses national boundaries, and c) there are only a small number of institutions worldwide that are offering a similar credential.

The program is actually conceptualized (when complete) as a group of approximately 18 courses. Students would be able to enroll in either the full Master's program or in one of several Certificate programs. Students who enroll in a Certificate program would be able to continue on the Master's

program if they so chose.

The Master's program will consist of six core courses and five elective courses. In addition, a student would be required to take either a distance education project course or an additional two elective courses.

The Certificate programs would be aimed at specific market niches. UMUC's analysis suggests that these potential students, in general, do not desire a full Master's degree (either because they do not think they have the time or energy, or because they already have an advanced degree and only want to upgrade or retrain). One example of such a Certificate would be the one designed for librarians. These students would likely be enrolled in another MLS program, or would be working librarians who would like to obtain a specific set of additional skills and knowledge. This Certificate will consist of 4 courses (two of which would be from the basic core of the Master's program and two which would be developed specifically for the certificate as well as be electives in the Master's program. Similar Certificates could be offered to Information Technology professionals, K-12 teachers and administrators, trainers in business and government, and military trainers, and to various international markets.

Proposed Courses in the MDE Curriculum:

- Foundations of Distance Education
- Distance Education Systems
- Technology in Distance Education
- The Management of Distance Education
- The Business of Distance Education
- Instructional Design and Course Development in Distance Education
- Issues in the Delivery of Library Services to Distance Students
- Electronic Information Literacy: Using the Web for Research
- K-12 Distance Education
- Training at a Distance and the Corporate Virtual University
- New and Emerging Media in Distance Education
- Web-Based Learning and Teaching and The Virtual University
- Student Support in Distance Education
- International and Cross-Cultural Aspects of Distance Education
- Advanced Technology in DE 1- Synchronous Learning Systems
- Advanced Technology in DE 2 -Asynchronous Learning Systems
- Information Technology and Distance Education
- Teaching and Learning in Distance Education
- Distance Education Project Option

Further information regarding the UMUC Master of Distance Education degree can be found at: http://www.umuc.edu/mde/.

Author Information

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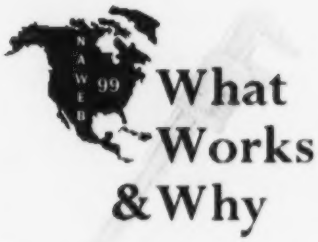

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Chemistry

Previous NAWeb conferences

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Academic Preparation for Science: A Multimedia Project

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Summary

Academic Preparation for Science (APS) is a multimedia program designed to prepare adult students, primarily Aboriginal, for success in Grade 12 Science. APS provides a stimulating and motivational learning environment for adult students who may not have been successful with traditional methods of learning science. The materials are Canadian based and have an Aboriginal focus. Using real-life examples that reflect Aboriginal lifestyles and heritage, instruction in biology, chemistry and physics prepares students for senior science courses.

The project uses a systems approach to instructional design, placing the learner and learning environment at the centre. The project consists of a seven-unit CD-ROM; instructor and student print manuals; a Web site listing objectives and overviews, on-line testing and live Internet links.

The evaluation of the APS program was funded by the Office of Learning Technologies and occurred between January 1998 and February1999. The highlight of the product is its ability to stimulate critical thinking and to motivate students. As a bridge, APS provides content, appreciation of science and motivation to succeed in further study. The project evaluation was completed in March 1999 and the products were made available in June 1999.

Academic Preparation for Science: A Multimedia Project

Overview

The overall goal of the APS program is to develop a basic, practical perspective to the study of science for learners who have less than a Grade 12 Science level. The APS program is intended to be a package that provides flexibility and accessibility to preparatory science via multimedia interaction. The product provides a bridge by using real life situations and everyday experiences to create an interest in science.

Description Of The Courseware

The program consists of seven modules that were developed on a CD-ROM with the Internet as a support. The four introductory modules are titled Science and Us, World of Work, Decision Making, and Learning Science. The other three modules focus on basics in biology, chemistry and physics. The content is written to reflect views and interests of adult students in Saskatchewan (and Canada) and to incorporate the interactivity enabled by the use of multimedia to deliver the information. The focus is on science and Aboriginal lifestyles as related to tradition in medicines, the teepee, and hunting, fishing and trapping. Testimonials of Aboriginal and non-Aboriginal people working in fields of science are part of these modules. Aboriginal people who had led traditional lifestyles and then worked in uranium mines were interviewed to provide information regarding their change in lifestyle and the effects of the changes.

An Internet Web site (http://www.siast.sk.ca/~science) and manuals support the CD-ROM. The Internet contains module overviews and objectives, as well as support resources. Each module cites valuable video and print resources, and Internet hotlinks to sites with related information. The exams for each unit are delivered through on-line testing. This testing system provides immediate feedback for objective test questions but requires teacher-marked responses for subjective questions. Email and a discussion room are also provided for instructors and students. The manuals contain the information from the Web site and additional orientation information.

The Evaluation

The evaluation of the APS program was funded by the Office of Learning Technologies and occurred between January 1998 and February1999. There were six evaluation sites in Saskatchewan including learning centres in northern, rural, urban and First Nations communities. Two forms of evaluation occurred.

The first was a formative evaluation of the effectiveness of the learning materials in meeting their stated outcomes. As a result of a preliminary literature review, the framework suggested by Hannafin & Peck (1987) was adapted for use in data collection and analysis. The framework examined the APS learning materials in terms of Instructional Adequacy, Curriculum Adequacy, Cosmetic Adequacy and Program Adequacy. Methods included questionnaires, logs, focus groups and observations.

The second form of evaluation was an assessment of the impact of the APS program on the students' learning and change in attitudes to learning science. Methods included a pre-course assessment of student access to, and use of, computers; a pre-course assessment of student attitudes to computers; a pre- and post-course scientific attitude inventory of students (Moore & Foy, 1997); and a post-course evaluation of the student satisfaction with the APS program.

The Results

During the formative evaluation, the following were identified as strengths:

- the ability to promote critical and higher order thinking skills in students;
- students were more interested in learning;
- students' felt empowered as they had control over their own learning;
- improved self confidence and self esteem in students;
- the way the curriculum relates science to everyday life;
- the way common careers are related to science;
- the simultaneous presentation of audio and visual images;
- the sequenced instruction;
- learning in a new way, i.e. links to the Internet, using technology to learn about technology;
- the ability of students to progress independently through portions of the program

As a result of the formative evaluation, limitations were also identified. The following table illustrates the changes that occurred to improve the overall effectiveness of the learning materials.

Limitations identified during the formative evaluation	Corrections to improve the effectiveness of the learning materials
The APS materials do not provide a complete bridge between Adult 10 and Adult 12 science	The addition of content, particularly in the chemistry portion.
Participants did not feel the materials could be used in an entirely independent situation	The addition of interactive question guides that help students determine the major areas of focus.
There were mixed opinions about the appropriateness of the amount of Aboriginal content in the materials	The addition of orientation and background information in the manuals to explain the significance of culturally-focused examples of science.
Initial versions of the materials contained a large number of errors such as spelling, text that did not fit the computer monitor, poor sound and picture quality, and inconsistencies between the CD-ROM and the manuals	Manual revisions to ensure consistency with the CD-ROM. Elimination of sound and video problems. Upgrading the glossary on the CD-ROM.
Navigational problems, primarily the lack of a bookmark system that would allow a student to return to a specific section of the CD-ROM.	The addition of a checklist in the manuals so students can keep track of where they have been; increased directions on the screens to guide student navigation.. Earlier student access to the summary section of each module, rather than requiring the student to proceed through all components first.

Discussion

One of the most significant findings of the evaluation is the necessity for adequate time and resources for the development of multimedia instruction. Tight timelines and an under-resourced budget are accountable for many of the problems identified during the formative evaluation that clouded the ability to assess the true effectiveness of the learning materials.

Despite that, teachers complimented the developers for the quality of products developed under the circumstances. In fact, teachers were amazed at the level of discussion and debate among the students

while working through the introductory modules. The most significant benefit of the APS materials is the ability to stimulate critical and higher order thinking skills in students. The second benefit is the improved self-confidence and self-concept reported by students and observed by teachers. This is particularly important to adult learners who have not had successful educational experiences in the past.

Despite mixed reactions to the amount of Aboriginal content, a third significant benefit of the APS materials is the integration of culture and technology. The materials in the introductory modules highlight the contributions to science by Aboriginal culture and relate science to everyday life in the past and in the present.

While one of the original objectives of the APS materials was to allow for independent use, the evaluation does not bear this out. Although all teachers said they would use the CD-ROM again, none of them felt it was adequate for use in an entirely independent setting.

Further Information

For information about the project and a listing of the references, please visit the project Web site at http://www.siast.sk.ca/~science . Additional information about the design, development and management of the project can be found at http://www3.sk.sympatico.ca/bbremner.

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Why Bother? - Reasons for Making the Web Accessible

Katharyn Foster, University of Toronto, Canada

Summary

Designing your Web content to accommodate the disabled is more than a legal and ethical responsibility these days; it is also good business sense. Individuals with disabilities are becoming a computer-savvy force to be reckoned with and a significant portion of the market for products and services, including higher education. This paper identifies common misconceptions about Web access for people with disabilities and offers some insights into the reality in the context of current Internet technologies.

Why Bother? - Reasons for Making the Web Accessible

Introduction

Access to the information, products and services provided by the Internet for users with some form of disability is just good business. This is not an issue of charity. It is an issue of market leadership, it is an issue of economics; the recognition of which means increased customer loyalty and market share. If you want to stone wall your competition making your Web site fully accessible is an excellent first step.

In 1991 separate studies conducted by the Government of the United States and the Government of Canada revealed one in five of their general population has some form of disability. These studies defined disability as an impairment in one of six areas; seeing, hearing, speaking, lifting and carrying, climbing stairs or walking.

The percentage of the general population with some form of disability has been steadily rising. Within this group of the population it was found the employment rates for those between the ages of 21 - 64 who are able bodied is 81%. For those with moderate disabilities the employment rate was found to be 76%. For those with severe disabilities the employment rate was 27%.

A truly meaningful statistic indicated that able bodied and disabled recent graduates are earning roughly the same wages. This age group, 21 to 64, encompasses the so called "Baby Boomers. The boomers are the most computer literate and affluent segment of society in the history of the human race. As these people age they will acquire increasingly common disabilities such as loss of sight, decreases in dexterity, etc. They will not go quietly. The boomers have lived some of the richness and most rewarding lives imaginable. As they age, while accepting some curtailment in their activity, boomers will not be prepared to accept what previously passed as retirement. In fact they will fight to maintain their lifestyle, independence and mobility. And they have considerable resources to conduct that fight.

The future may belong to technology, but the successful companies will be those who use technology to put the needs and expectations of its customers foremost in the design and delivery of their products and services. Technology which is inaccessible is useless.

There are lessons to be learned now regarding what works and what doesn't. These lessons come from two principal sources. First, the boomers are caring for their parents now. They are coping with the very issues now which will affect them in the not to distant future. The boomers are preparing now for the senior years. Second, the current population of people who have traditionally have been described as with some form of disability are among the most intelligent and resourceful people in society. They are used to overcoming problems and adapting to situations. We suggest an astute businessperson will tap these two areas when designing products that will not only capture market share today but also pay dividends well into the future.

How far have we come?

Think things are better now than they were even five years ago? We espouse truths and beliefs in a myriad of documents. The US Declaration of Independence begins with "We the people. . ." Article 23

of the United Nations Children's Fund's (UNICEF) Charter states a disabled child has the right to special care, education and training to help him or her enjoy a full and decent life in dignity and achieve the greatest degree of self-reliance and social integration possible.

Well, think again. In Ontario you can take your driver's examination in a number of languages but you can not get a copy of the Blind Person's Rights Act, part of the Humans Rights Code of Canada, in Braille. A blind woman and her guide dog were denied access to a church in Toronto. The clergyman was assessed a substantial civil penalty, but was unrepentant. A bank recently installed a Braille automated teller machine, in its drive-through window. But the ATMs in the lobby are not accessible. Just how far have we come?

Common Misconceptions

The Web is a great resource for persons with disabilities allowing access to information, course materials, shopping etc, from the comfort of their own homes.

Not true.

Many people believe that the Internet is the answer to the prayers of all people who may face mobility challenges as a result of disability or infirmity. After all, the Internet allows access to a range of things from the comfort of your own home. One may shop, order theatre tickets, conduct research, participate in courses etc., without ever leaving your chair. What could be more convenient than placing your grocery order online and waiting for your friendly neighborhood delivery person to bring your goods to your very own door.

As far as education goes, why bother with transportation to and from a campus? Enroll on line, pay your fees with a credit card, attend virtual lectures, even tour museums and conduct all of your research online as well? After all, all you need is a computer, an Internet Service Provider and a modem (unless you get your access through the Cable Service)!

Ah, but you see, there in lies the rub, access to the Internet is neither universal nor simple. Even once you are logged on searching, scanning and otherwise making use of the information can be staggeringly difficult. There is a great deal more to using the Internet than simply having a personal computer and logging on. It's the human interface that causes the problems... particularly when the interface is with someone who uses adaptive technology.

How does this problem manifest itself? Let's begin with an easy example someone who is totally blind and uses a Braille display or speech technology not a video terminal. Suddenly, all the graphics, icons, etc are meaningless. Both speech and Braille rely on text and do not interface with graphics.

Suppose our user has severe arthritis and can not effectively manipulate a mouse. How will they access all the links, jumps or pop up windows? Many other forms of disability are nearly invisible such as learning disabilities. Therefore the potential users of adaptive technology, particularly alternative ways of reading Web sites, using refreshable Braille displays and screen readers, are greater in number than you might first think. Will this large and growing segment of the marketplace be attracted to your product or service; will they simply turn away from sites which are difficult or frustrating to use; perhaps they do not know you exist at all?

Another important consideration is the interface between adaptive technology and commonly used software. One of the major challenges faced by persons with disabilities is the reality that no matter how up to date their adaptive technology is, it cannot keep pace with the advancement of software. Not even ten years ago, Bill Gates founder of Microsoft, stated that no one would need more than X number of megs in their hard drive. Well X has come and gone and the need for greater space and speed are still driving the computer industry.

Adaptive technology users will always be using word processing, spreadsheet, database and other

mainstream software which are several versions behind other main stream users. If their peers at the office are using Windows 98 or Windows NT, their adaptive technology is probably only compatible with Windows 95 maybe even Windows 3.1!! In fact, when Windows first came out, the adaptive technology would not interface with it at all and people using Braille, speech and other adaptive technology were forced to remain in DOS. How many friends have you known who had to change their operating systems because a vital software package was not available in an earlier version of their operating systems? Recently, a colleague had to update his entire office to Windows 95 for this very reason.

The adaptive technology companies are constantly scrambling to make their products compatible with mainstream market items. Even though some adaptive technology companies have entered into working relationships with software developers, there are still many challenges to overcome. Most prevalent of course for people with disabilities is the cost of adaptive technology equipment. A modest Braille display can cost more than $10,000 USD and take more than a year to become comfortable with. Now try to replace that technology every time software moves into the next version. A virtual impossibility for most adaptive technology users.

Considering the advancement of technology, the Apollo 11 spacecraft which took Armstrong, Aldrin and Collins to the surface of the moon in 1969 contained a state of the art computer with a fraction of the power of a Commodore 64. The office organizers some of you may be carrying around right now could power a space craft to the moon and still remind you to send your spouse flowers on your anniversary!

As with all other things, adaptive technology moves in reaction to supply and demand. Thus, it is often the case persons with disabilities are forced to use older less sophisticated versions of software packages simply because their adaptive technology will not interface effectively with the most current packages available or they can not spare the time or resources to continually upgrade their equipment.

On top of this, Web designers have focused so much of their attention on technological wizardry that they have rendered the Internet difficult and in many cases impossible for persons who use adaptive technology to access. Most adaptive technology relies heavily on text based information. However, this does not create pretty dancing letters and flashing images. Although these graphics may be attractive to look at, they are definitely not Braille or screen reader friendly.

Thus, the Internet which could be a wonderful resource for research, information, education and much more is still very inaccessible to a largeand growing segment of our society.

People with disabilities do not pursue higher education and don't have an interest in accessing related materials.

Not true.

Historically, children with disabilities were segregated into highly specialized institutions. For example, students who were visually impaired or blind would go to Schools for the Blind. Children who facing a range of hearing impairments would go to Schools for the Deaf and so on. In this way these students were kept out of the public education system and mainstream society. Consider also the conditions which today's executives with disabilities had to face when they went to University. Personal computers are a relative new addition. When did you get your first PC? Adaptive technology has historically been ten years behind mainstream technology. So if PCs first became readily available in the 1970s; adaptive technology began first appearing in the 1980s. How about books on tape, another relatively new development? Scanners, on-line resources, even portable tape recorders are all relatively new technology.

So just what did today's executives with a disability have to put up with? Brigades of volunteers readers, reading to their schedules not necessarily yours. Books in alternative forms which were several editions behind their classmates'. Note taking by Braille stylus or poor quality reel to reel

tape recorders. Tests in alternative format? Not likely. How about submitting papers? Working in groups? The principal "handicap" faced by students then was the attitudes of peers and educators that they could not keep up nor be serious about receiving a higher education.

As a result of this segregation, students were not given the same opportunities as those attending mainstream schools. These students were also not encouraged to pursue post secondary education nor do many of the same socioeconomic steps as the able bodied apply. In fact many people with disabilities have been actively discouraged from pursing that which the able bodied take for granted. For example, to pursue higher education, to seek employment, develop relationships, get married, have families, aspire to careers, conduct original research, etc. Students with disabilities were considered to be high achievers if they managed to complete their high school education. They were not expected to pursue college or university degrees let alone be wage earning contributors to society.

There were few if any supports in place to assist these students in accessing these higher levels of education. Thus, any student who wanted to attend college or university had to fight the attitude of a society that wanted them to sit quietly in a corner and be grateful for any scrap that was thrown their way. Their able bodied peers as well as their professors and teachers did not take their pursuits seriously.

The advent and accelerated progress of technology, not to mention a societal change in attitude resulting in students with disabilities being integrated into the mainstream school systems, has drastically changed the options for students with disabilities. Suddenly, students with disabilities had access to technology which somewhat leveled the playing field between them and their able bodied peers. Funding for equipment, books/course materials in alternative formats and other resource supports became available to students who wanted to pursue higher education. This technology enabled students with disabilities to become more independent and contribute on a much more equal basis than ever before.

This integration facilitated the acceptance of people with disabilities as their able bodied peers, future colleagues and coworkers are first hand witnesses to their skills and potential. Today, there are students with disabilities all over the world enrolled in and graduating from a wide range of college and university programs. They are student counsel members, athletes, editors of school papers. They have gone on to become Doctors, Lawyers, Engineers, Judges, Teachers, and Political Leaders. In fact, Dr. William Roland, who played a pivotal leadership role in the overthrow of apartheid in South Africa, is totally blind.

Although there is still a great deal to do in terms of making education accessible to students with disabilities, each student has something to teach and hopefully one day the playing field for all students will be truly level.

People with disabilities spend their lives receiving social assistance and thus, have no disposable income.

Not true.

In fact, the opposite is often true. Historically persons with disabilities have not been able to pursue higher education and white collar professions. However, lacking the physical characteristics which most of us take for granted has forced people with disabilities to gravitate towards careers that require intellectual skills. With the advent of technology and its rapid evolution, these changes have been more dramatic than could have been reasonably forecasted.

As a result of the limitations placed upon them by the disability itself, it is rare that persons with disability can do the 'just get me by' jobs so often categorized as minimum wage. Therefore it is necessary for persons with disabilities to seek higher education, quite often to the graduate level. This means that these individuals end up being white-collar professionals, which carries with it higher income and social standing. This also means a greater amount of disposable income.

Even though you hear about the occasional high achieving person with a disability, (like Stevie Wonder or Jeff Healy) there aren't that many of us anyway.

Not true.

History is replete with examples of people with disabilities who rose to greatness. Franklin Delano Roosevelt led the free world through world War II, yet was completely confined to a wheel chair. Beethoven created a masterful body of musical compositions yet was completely deaf. Lou Gehrig did as much for American Society raising the awareness of disabling illnesses in consciousness of the American people as he did for the New York Yankees batting behind Babe Ruth.

Today, the percentage of the general population with some form of disability has been steadily growing and now represents a considerable share of the marketplace. The boomers are aging and beginning to face the challenges associated with this process, hearing loss, vision loss, arthritis etc. These are high profile, high income, powerful individuals who will want to maintain their lifestyle regardless of any disabilities that come along. They are also a computer savvy group who are used to access to the Internet and will require the Web to be accessible as they rely more and more on adaptive technology.

Technology has enabled people with disabilities to complete higher education, compete for professional positions and advance in careers much the same as their able bodied peers. They now lead complete and meaningful lives contributing to society much the same as others do - earn good salaries, pay taxes and even volunteer their time. Any company wanting to demonstrate leadership now or in the near future will keep this market segment loyal with accessible product and services.

The Bottom Line

Education is, when all is said and done, a business. And businesses so often focus on the bottom line, despite the efforts of individuals like Paul Newman and the late John F. Kennedy Jr. So what is the bottom line for Accessibility? What's in it for you?

One in five North Americans have some of form disability.

This percentage continues to grow. Those individuals who are aged 21 to 64 today represent the most computer literate and affluent segment of society in history. There is every indication they will want to maintain their lifestyle even as they age. Capturing and holding this segment of the marketplace should be a top priority. Companies that demonstrate leadership in serving the needs of users through accessible, easy to use products and services will have a distinct competitive advantage.

These individuals are highly motivated and view their time as more valuable then yours.

They will be attracted to companies, products and services which respect this premise. Boomers are used to "instant gratification." Struggling through downloads, meaningless graphics, and applets that add nothing to their experience will turn them off quickly. If you aren't able to reach them with good service and tell them why your product or service is better than that of your competitor, they will simply buy from your competition.

Governments have implemented mandates/legislation regarding accessible products and services.

This paper treads lightly here. The true driving force must be economic and the desire for market leadership. Traditionally, issues which were forced upon business or society are spurred and many times ignored. It is true that there is a plethora of legislation mandating services and accessibility. There also is the potential for intervention through the government, regulatory or judicial solutions. However, the real issue is economics. Companies will embrace issues where there is growth and profitability.

Not only is accessibility the ethical thing to do; and the legally required thing to do; it also makes economic sense. It is simply good business. Who gets there first with the best product or service wins. Not often does one enjoy the opportunity to truly stonewall one's competition and lock up such a large and affluent segment of the marketplace.

One should also consider the fact that Governments are a principal source of financing for adaptive technology. Persons with disabilities often seek the financial resources from various government departments. Such support fulfils the mandate of government to make their populations as productive and independent citizens as possible.

This population is becoming more unified and speaking with one very loud, influential, and powerful voice.

As this group grows to be more unified and to better understand its economic potential and legal rights, it will be more apt to fight for those rights. Spending time defending yourself in the courtroom will not only cost you in terms of time and money but will negatively reflect on your public image.

If David Foot, author of "Boom, Bust and Echo" is right, a huge segment of society is about enter a time when planning for retirement and actually retiring begins. Companies which take advantage of such trends will be profitable, those who do not may not survive. Organizations which conduct group buys of products and services now for their members, such as the American Association of Retired Persons, are merely the tip of the iceberg.

Having access to this market will dramatically affect your bottom line.

With disposable income, education and time, this portion of the marketplace could dramatically increase your bottom line. If you are willing to be accessible on the Web, provide positive and helpful customer service and recognize the worth of these potential clients, you will definitely outpace the competition.

Remember too, we are talking about 20% of the population in North America. What company would not want to be the dominant player in such an affluent segment of the market?

Conclusion

The reasons to make Web content accessible are legally, ethically, politically, and economically compelling. Take a good look at your own Web site. Now try navigating it with your eyes closed. Impossible? It doesn't have to be.

Author Information

Katharyn Foster works as a program coordinator at the Adaptive Technology Resource Centre, University of Toronto, specializing in issues related to access to information and education. Her expertise is based on 15 years working in the disabilities community, and additional experience as a partner in a Multi-National Consulting Firm. Her educational background includes a B. Sc. Applied Health Sciences, University of Waterloo, (1995 - present).

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Evaluating Student Perceptions of Web-based Learning

Clinton H. Isbell, Clemson University, United States

Summary

A recent study was conducted of 28 students in a graduate course of Evaluating Training and Development/HRD Programs to determine their perceptions of the use of distant learning strategies versus those of traditional classroom methods of instruction. This course, HRD 849, is one of 6 required course in the Masters of Human Resource Development program at Clemson University. Traditionally taught one night each week during the fall and spring semesters, the course content was revised to be taught over a four-month period beginning during the spring, 1999 and concluding in August, 1999. This particular course utilized a variety of distant learning strategies including online team discussion groups, team projects, online quizzes, online resources, etc. Three different online course development applications were used to help support the course content and delivery. The primary support was through a department/faculty Web site, the use of WebCT, and the Collaborative Learning Environment (CLE). The CLE is an integrated management and course development program developed at Clemson University for support of online courses. A survey instrument was developed and administered to the students in HRD 849 to determine their perceptions of the various activities and utilization of online distance learning applications. These results have been compiled and will be shared with the participants of the Fifth International Conference on Web-Based Learning.

Evaluating Student Perceptions of Web-based Learning

Details

With the rapid expansion of the use of technology for support of traditional classroom instruction and online course development, critical issues of concern among program developers will be the challenge to develop courses that effectively integrate technology and build on the most effective instructional design elements. During the summer, 1999, the delivery of a graduate level course, HRD 849Evaluation of HRD/Training and Development Programs was revised to integrate the use of Web-based technology in an effort to enhance the course requirements and to provide greater distance learning flexibility for students in the course. The majority of students taking his course were working full time, with varying job schedules that limited their participation in traditional classes, and in addition to traveling at a distance to take the course.

Traditionally taught one night each week during the fall and spring semesters, the course content was revised to be taught over a4 month period beginning during the spring, 1999 and concluding in August, 1999. Three on site weekend meetings were supported by the use of a variety of distant learning strategies and activities. These activities included on line team discussion groups, team projects, online quizzes, and online faculty discussion areas. Three different online course development applications (a primary faculty department Web site, WebCT, and the Collaborative Learning Environment) were used to support these activities during the course. The primary support for the course was the department/faculty Web site that was used to provide worksheets and lecture material for preparation of in-class exams. WebCT was used primarily for on line quizzes, team discussion areas, bulletin board postings, course management, and calendar listings. The Collaborative Learning Environment (CLE) was also used as a support area for submitting course materials in-lieu of email and student management activities. The CLE is an integrated management and course development program developed through Clemson University.

Through team evaluation projects, students were encouraged to use online discussion groups, teleconference, fax, and email for communication during the course. Logs of team meetings were recorded and submitted throughout the course as a means of documentation. An assessment survey was administered to the 28 students at the end of the course to determine their perceptions of this technology-based learning experience and the related activities. It was generally found that using technology-based instruction not only allowed students to become more interactive with each other and

the faculty during the course, it was also determined that student participation in team activities increased.

The overall results of this survey will be shared at the Fifth International Conference on Web-Based Learning and on supporting Web sites.

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Molecular Structure Tutorial: Visualization for College Chemistry

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Summary

The Chemistry Department at the University of Texas (UT) was awarded a grant to create a series of tutorials for introductory chemistry courses. The College of Natural Sciences at the University of Texas has 8,941 students and a five-year attrition rate of 70%. This means that only about 30% of natural science students complete a degree in five years. This attrition rate can partially be attributed to large lecture classes and a lack of supplemental instructional materials and lecture aids for the introductory chemistry courses. The series of tutorials will be made available as supplemental instructional materials (tutorials) for students enrolled in introductory undergraduate chemistry courses in CD and Web-based format.

Molecular Structure Tutorial: Visualization for College Chemistry

Details

The first tutorial, a work in progress, focuses on Valence Shell Electron Pair Repulsion (VSEPR) theory. The goal of this multimedia project is to help chemistry students Visualize Electronic and Molecular Geometries of Polyatomic Molecules and Ions.

This demonstration is focused on the instructional design process being used to create the VSEPR tutorial: needs and learner assessment, instructional analysis, writing performance objectives, developing assessment instruments and instructional strategies, developing and selecting instructional materials, formative and summative evaluation plans and procedures. The Macromedia authoring tool, *Authorware Attain*, is being used to create the tutorials.

References

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